January 197

Smithsonian

New U.S. interest in mime (p. 66); Noel Parenti in role of 'Star Ranger'

This old city has survived bombardments, invasions, earthquakes, and real estate developers.

This is Charleston, South Carolina as it looked in September 1973. Aside from some inevitable intrusions of modern society, this is much the way it looked to the people who lived here in September 1776.

No other Colonial city in America has managed to withstand the ravages of time so well, and to adjust so gracefully to the 20th century. Charleston today is a living museum complete with houses, churches and public buildings, some of them dating back as far as 1712.

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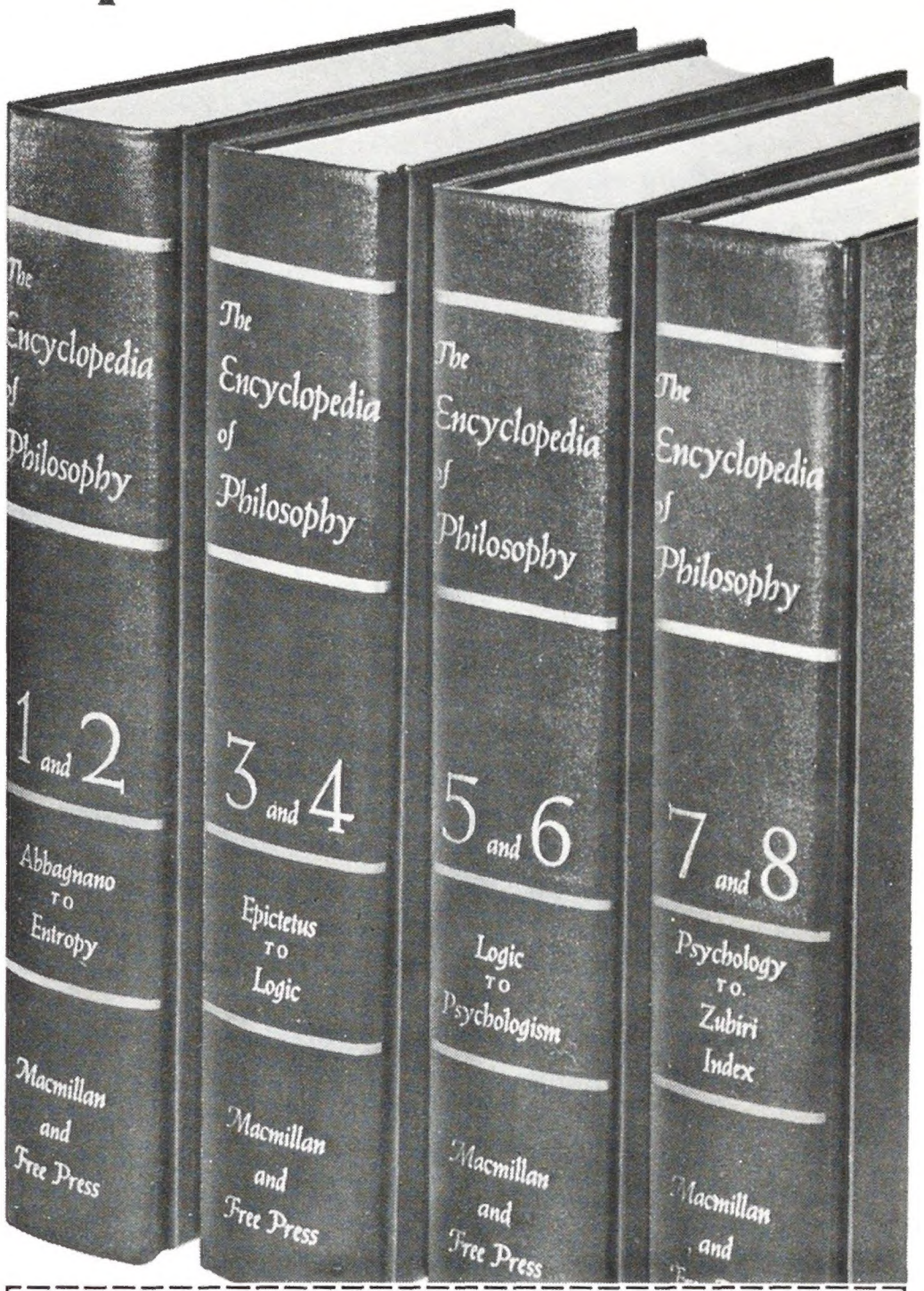

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Secretary Ripley's comments

The view from the castle

More than ten million people may arrive on the Mall for the Bicentennial, but where will all of them stay or eat or park?

A year from now Washington will commence the banner year of 1976. One study estimates 44,000 cars and 142,000 visitors will "come see us" on the Mall on a typical summer day. During the year we expect nearly 23 million visits to our buildings, 40 percent more than usual. Of course, the average visitor may enter more than two buildings, but usually exhaustion will prevent all but the hardiest from visiting three or more. So people visiting the Mall alone should number more than ten million.

In 1965, ten years ago, the Smithsonian commissioned a visitors center project study at the request of our Regents, particularly the late Congressman Frank Bow, who had hoped that the Institution could take over Union Station as a museum of transportation and visitors center. Our figures showed that some 1,400 cars (somewhat more than the original capacity of the parking on the Mall) could be parked behind the station, presumably with a shuttle bus service down to the Mall. It was estimated that the visitors center project would cost $27 million (more if it became a museum), plus $22 million to purchase the property. The idea was promptly labeled economically infeasible.

Now, ten years later, Congress has been having off-again, on-again feelings about the National Visitors Center at the Union Station site, and under the manful proddings of Congressman Kenneth Gray has grudgingly authorized some $21.7 million to develop the center on behalf of the Park Service with no firm date for completion and spaces for only 1,200 cars.

At the same time, proposed alternative off-Mall parking sites, 21 in all, have been reduced to three. But schemes for the greening of the Mall go on: The center roads there are being made into pedestrian walkways, and gardens and other esthetic projects proceed, further limiting available parking spaces.

Since 1965 all plans, with the exception of the visitors center, for underground or adjacent parking have been scrapped. And yet the inexorable use of cars by Americans continues, even as bus lines stumble, railroads turn to skeletons, and idealized plans for monorails, pedestrian malls, bicycle routes or water transport continue to divert our imaginations. The projected increase in tourists will of course be superimposed upon transit, parking, food and lodging facilities that are already inadequate for the normal flow of visitors. I remember well suggesting to Nathaniel Owings, consulting architect for the National Park Service on the Mall project in 1965, that he secure some camels and rubber-tired camel wagons to transport the weary tourists up and down the greensward of the Mall. The camels have velvety feet and would not scuff up the turf. But it seems unlikely that we could recruit enough camel drivers now in 1975, even if Congress would appropriate the funds.

A year hence I can visualize the doors of Smithsonian buildings swinging open on a July day with no one coming in. Way off in the distance a solid traffic jam ten miles long will have blocked all peripheral roadways. The "welcome" sign will be out, while far off a mass of humanity and machines will be locked in a technological full nelson. Thus the summer of '76 will pass with confusion rampant and shattered nerves galore. Perhaps it's only a nightmare. I wonder.

S. Dillon Ripley

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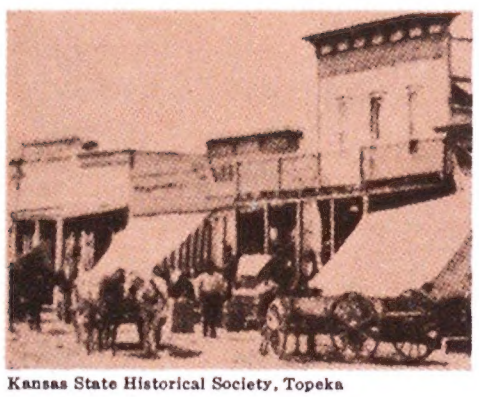

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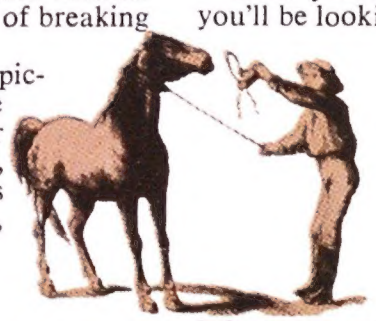

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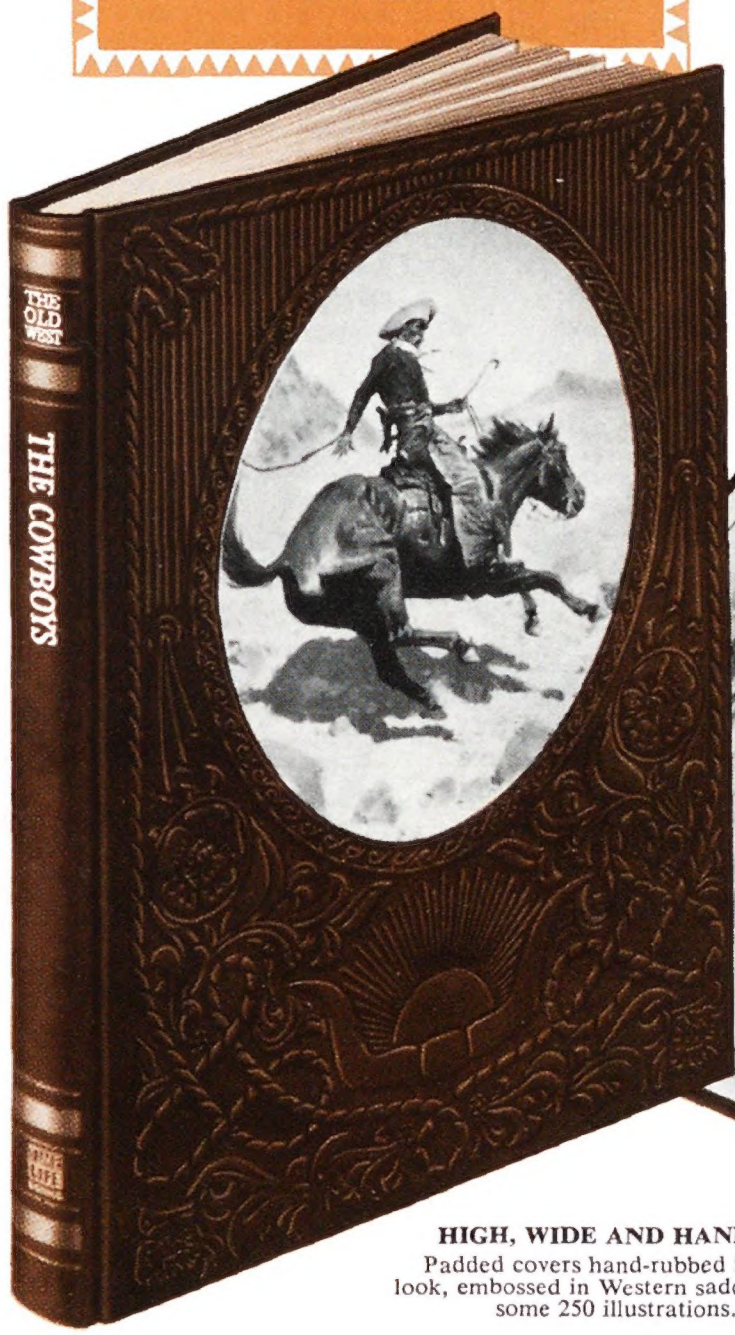

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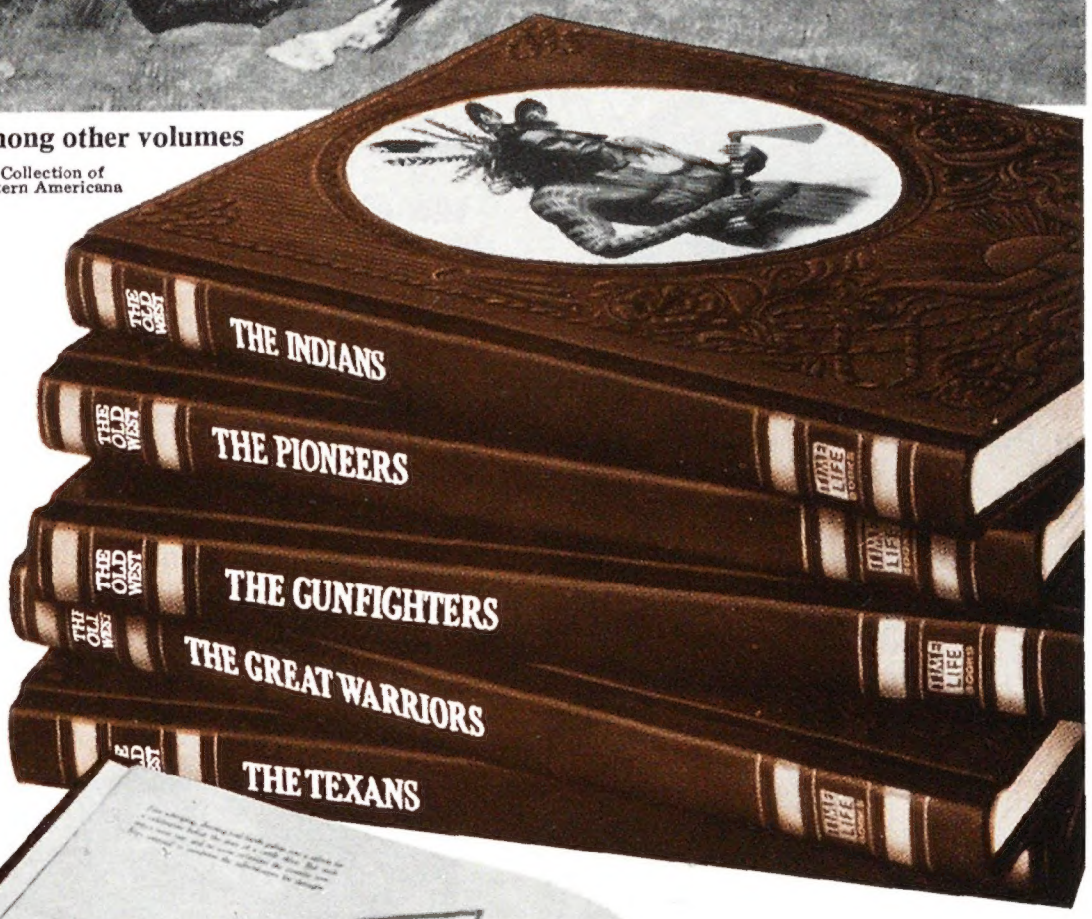

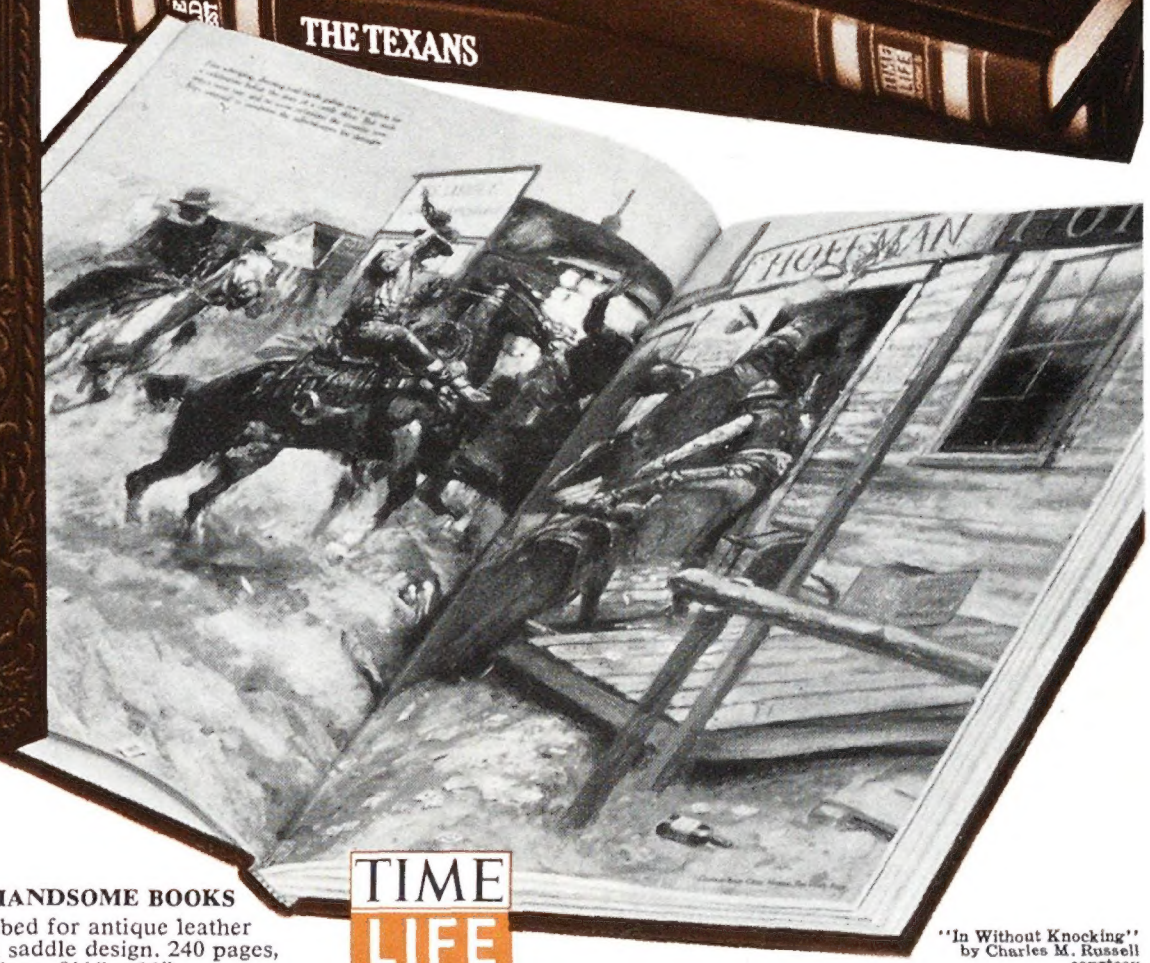

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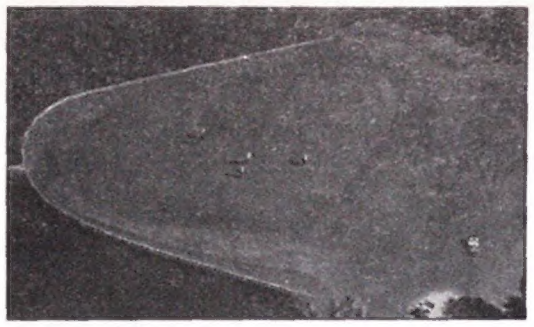

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Phenomena, comment and notes

Age, environment and vitamin E, the language of medicine, and the sudden end of the giant sloths

Think of the Ice Age and you probably also think of wooly mammoths, saber-toothed tigers and the other huge mammals that roamed the continents. What happened to them? They disappeared practically all at once (in terms of geological time). And one theory has it that they were wiped out in a great orgy of human hunting—what Paul S. Martin of the University of Arizona calls "explosive overkill." In the Western Hemisphere it occurred as waves of men moved south from the Arctic, with "a brief but devastating coexistence of hunters and large animals, lasting no more than a decade in any one region."

It all happened so fast, says Martin, that there would be little of the reassuring evidence—cultural artifacts—that paleontologists rely upon.

So, to back up his theory (to which not everyone subscribes) Dr. Martin has had to look elsewhere for evidence and most recently he has looked to one of the least prepossessing of the large Pleistocene animals, the giant ground sloth, and to what must be its least prepossessing remains—well-preserved sloth dung balls that in some caves here and in South America remain quite fresh after 10,000 years.

In Rampart Cave in Arizona, for example, Martin and a colleague, Austin Long, radiocarbon dated sloth dung from 40,000 years ago to 11,000 years ago, after which, he says in *Science*, the sloths disappeared for good. This is the same period when we know Clovis hunters were in the area (see Phenomena, comment and notes, December 1974). In Chile and Argentina, radiocarbon dates for the last sloths are slightly younger (more recent), confirming Martin in his belief that Man is the culprit.

Soviet energy crisis

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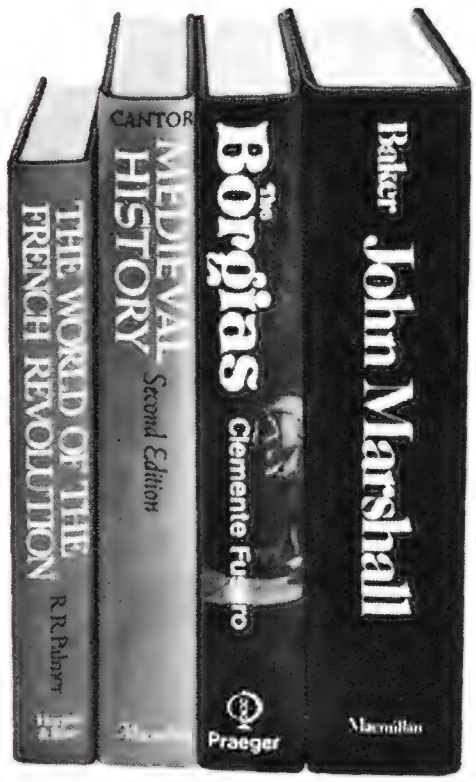

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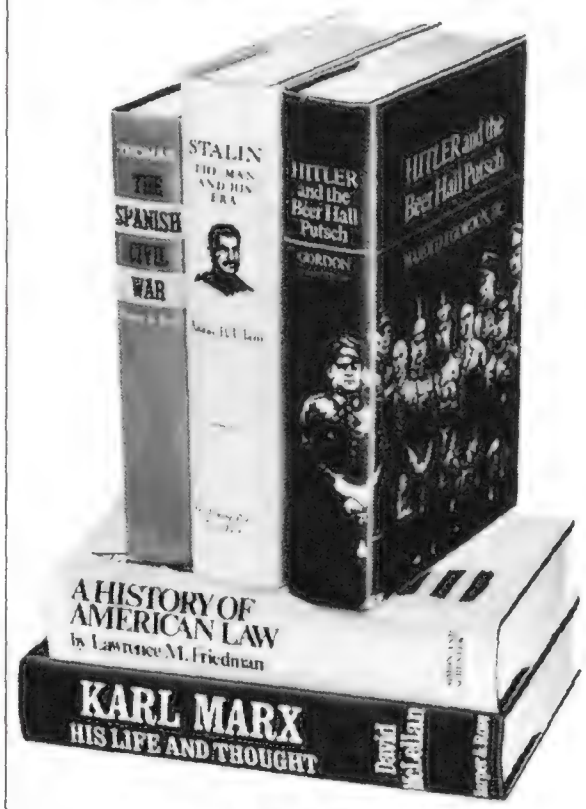

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recalls hearing that the Russians not long ago referred to Siberia as a "giant raft floating on a vast ocean of oil and gas."

Maybe so, according to Marianna Slocum writing in *Technology Review,* but an extensive analysis of Soviet documents indicates that the USSR is in a "bleak energy situation."

More than 80 percent of Soviet industry and about 75 percent of the population are found in European USSR and the Urals, but less than 12 percent of their fuel supplies are there. The energy deficit in these regions in 1970 "was approximately 15 percent of the USSR's 1970 fuel consumption and will probably increase five or sixfold in the future," according to one Soviet estimate. Imported oil from the Middle East has apparently not closed the gap, which can only increase as the Soviets seek to expand their industrial base.

And instead of concentrating their efforts on tapping that vast hydrocarbon ocean in Siberia, reputed to be greater than the Middle East reserves, the Soviets have stepped up exploration in the already depleted areas of European USSR and the Urals, as well as difficult offshore sites, and are investing needed capital in overhauling their coal industry.

Why? Maybe it's because the cost of extracting oil from a region so subject to cold, permafrost and summer quagmires and then transporting it westward is too great. A partial solution might lie in concentrating economic expansion in Siberia but, it seems, the Soviets are having trouble scratching up the necessary capital, so they now seek technical assistance and investment capital from the West to open the Siberian oil fields.

On the other hand, suggests Ms. Slocum, maybe there isn't all that much oil in Siberia after all.

Aging and vitamin E

Biologists are by no means certain what is going on at the cellular level in the process of aging. One theory has it that certain metabolic products oxidize and cross-link with constituents of the cell, thus interfering with the cell's ability to function properly. To analyze such things, scientists use human cells, such as lung cells, grown in vitro. These test-tube cells generally grow and reproduce for about 50 generations and then the culture dies.

Now two scientists at the University of California at Berkeley have more than doubled the life-span of their cell culture —by adding vitamin E to the culture medium. According to *Medical World News,* gerontologists are excited, but it is so long a distance from the test tube to the living human, that even the youngest among us should not assume that the fountain of youth is on the horizon.

However, a more immediate prospect is that vitamin E might help alleviate the stress human cells suffer from environmental factors such as pollution. A good number of pollutants act as oxidizers in the cells. Experiments are getting under way now to test the vitamin's effect on preventing unnaturally early "aging" caused by such pollutants as ozone and nitrous oxide.

Should Eskimos wear earmuffs?

Progress marches on, even on Baffin Island, and has replaced the Eskimo spear and dogsled with the rifle and snowmobile. Sentimentalists may wring their hands at the loss of the old, simple ways, but researchers at McGill University have found something more precise to mourn: About 85 percent of the Eskimos, young and old, have suffered partial hearing loss, presumably from the racket their new machines make.

Disposable thermometer, disposable word

Most people are aware that hospitals are the prime example of the throw-away culture—and of course there are logical reasons for using disposable pans and hypodermic needles and so forth. The process now may be nearing completion: A Dayton, Ohio, hospital used some 200,000 "Single-Use Thermometers" in a pilot program last fall, apparently to the satisfaction of staff and patients. The people at Bio-Medical Sciences in New Jersey, who manufactured the instruments, will no doubt be properly celebrated for this invention but, inadvertently perhaps, they have made another invention which should be roundly booed.

In announcing the results of the pilot program in Dayton, Bio-Medical Sciences reports that, to insure proper use, the nursing and paramedical staff were "in-serviced" by professional representatives of BMS. Not trained, but inserviced.

JAMES K. PAGE JR.

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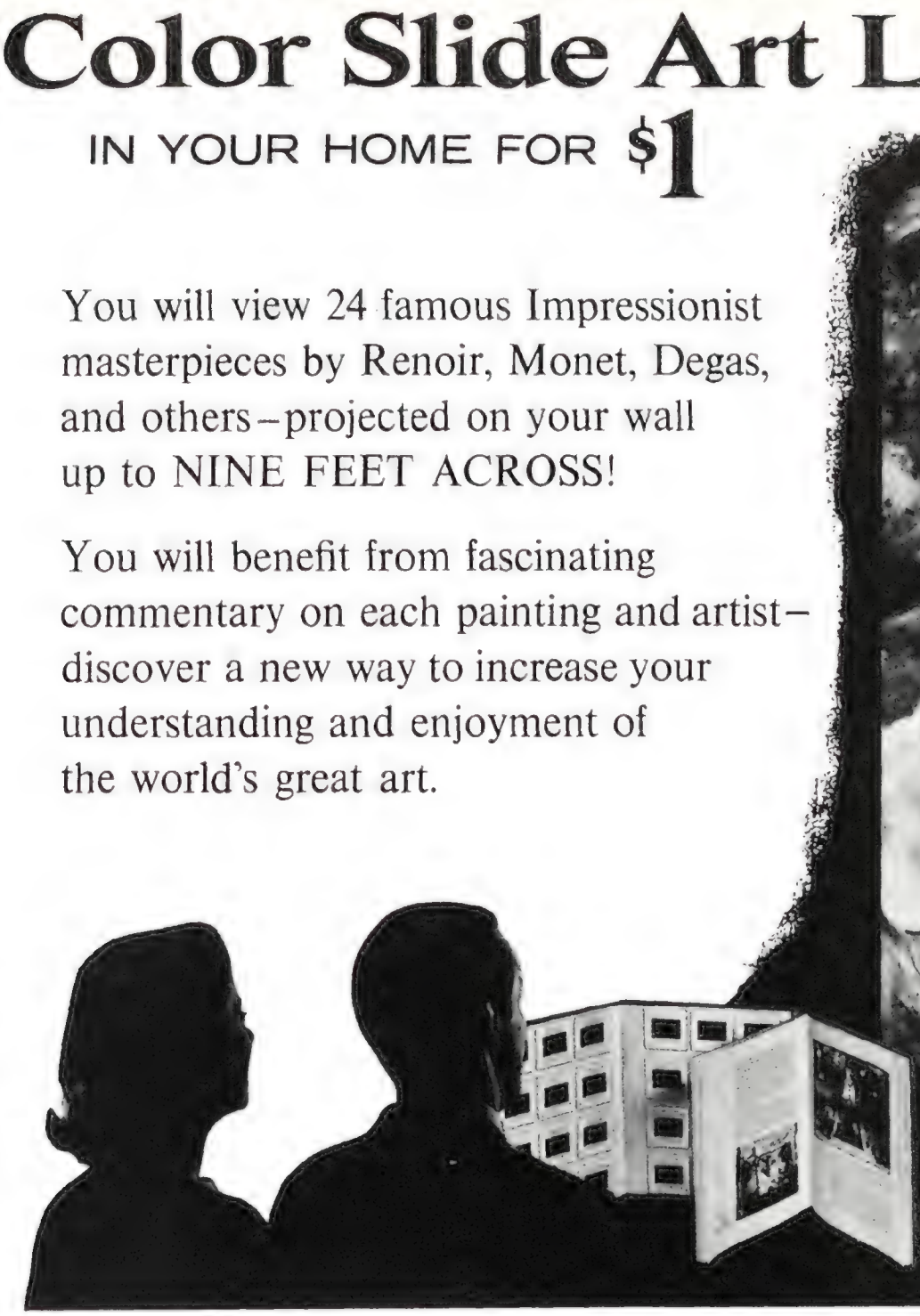

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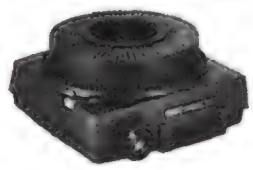

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Letters to the Editor

The Faces of Jesus

Dear Sir: In regard to the otherwise very interesting article and photographs in the November issue on *The Faces of Jesus,* I take exception to a quote from the author of the book, Frederick Buechner, a Protestant minister. He referred to this 12th-century French Corpus Christi as "Abraham, Shylock"—and described Jesus as looking "definitely Semitic with the shape of his nose, the cut of his beard. . . . He is a Jew here. . . ."

How could anyone link with a mere comma the Biblican patriarch of Hebrews, Moslems and Christians with the stereotype Jewish figure of the Elizabethan period? Both Christ and the Jews through the ages have had enough problems without interjection of bigoted descriptions.
David M. Geiger
New York City
The passage in the book reads: "He is Abraham, Shylock, Dreyfus, the Baal Shem. He is a Jew here, all Jews." No anti-Semitism was intended. Ed.

Overpopulation

Dear Sir: In your article on overpopulation, I found myself amazed but not amused by the statement of the Holy See's delegate, Monsignor Edouard Gagnon, that "soon we should understand the mysteries of the flesh so much more perfectly that all women would be able to avoid pregnancy at will without resorting to unnatural means." Monsignor Gagnon should begin to make use of the "resilience of Man" in his thinking.
Bud Stupi
Millersville, Maryland

Geothermal energy

Dear Sir: As a "natural energy" advocate, I wish to compliment you on your excellent article on geothermal power.

I became aware of this source of energy by contacting the state geologist in Oregon, about five years ago, to have the water from our hot spring analyzed. Since then, it has been heartening to see the utilization of geothermal energy grow. For example, Klamath Falls, Oregon, is one area where hot water from wells is used to heat homes, buildings, schools and greenhouses, at lower cost and with minimum environmental impact.
Jack H. Stevens
Seattle, Washington

Automobile comes to Tillamook

Dear Sir: I was very much interested in Lawrence Fernsworth's article on Tillamook County. I practiced medicine there for 25 years, beginning in 1923, shortly after Mr. Fernsworth left. I knew most of the people mentioned in the article, and have written a book about things that happened then, published by the Oregon Historical Society.
E. R. Huckleberry
Salt Lake City, Utah

View from the castle

Dear Sir: Secretary Ripley's vignette of the quiet glory of a New England pond in autumn is exceptionally well portrayed and moving. But his conclusion to this pastoral is that it is a joy to realize that there is so much about nature that we do not know. He "would rather keep such mysteries inviolate as reminders of the frailty of Man." To look upon only one level of nature, and consciously avoid another regime of nature's grace and splendor, should not bring serenity but frustration.

Are the colors of a sunset less vivid to me because I know of the refraction of sunlight that makes those colors? Is a sonata less lovely because of my knowledge of harmonics and wave propagation? Such knowledge only makes me appreciate the cosmos more. We both agree that one day we shall know nature in the full. But in the meantime, even though human knowledge is feeble, limited and seemingly insignificant, let us revel in what little understanding of na-

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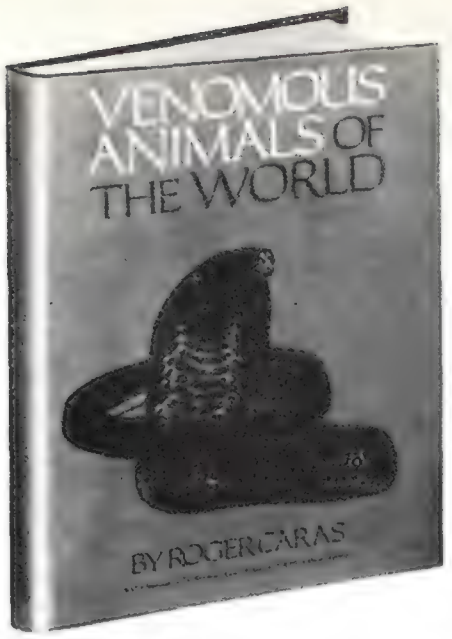

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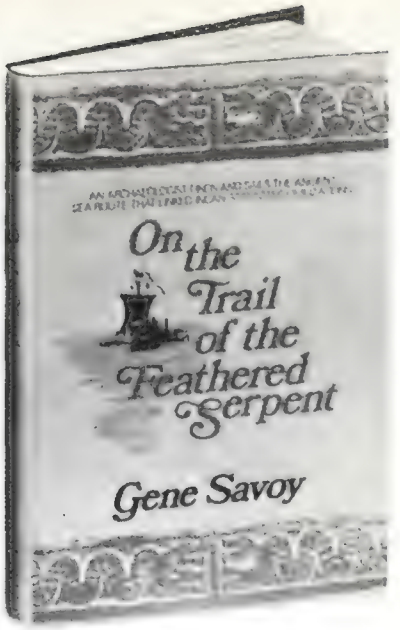

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ture we have that we may experience not only beauty, but perhaps truth.
Robert D. Caldwell
Department of Physics
University of California
San Diego, California
Beauty is in the eye of the beholder. Ed.

Dear Sir: I am not a scientist, but over the past 20 years and more it has been my privilege to serve as "errand boy" for some of the eminent ones. I think the best of them share the views Secretary Ripley expressed. Edward Purcell, Charles Townes, Caryl Haskins, Phillip Abelson and many others, each in his own way, has conveyed to me the same deeply imaginative thoughts expressed in this "view from the castle."
Garrison Norton
Washington, D.C.

The Dudelsack

Dear Sir: I have never quite understood the mentality (or ignorance) of a person who would vilify the esthetic preference of a group of people, in a vain attempt to be humorous. Your *Dudelsack* article failed to note that well-played bagpipes are a source of pleasure and inspiration for many of us.
B. X. Burgess
Stamford, Connecticut

Dear Sir: The drama of the pipes is in the ability to reach the listener's inner being. A lament brings tears; a regimental rallying song inspires men to battle. I know—I was there on Operation Dracula when the British took Rangoon back from Nippon. There is a question as to whether the pipes inspire or frighten.
Ted Fischer
Goleta, California

Dear Sir: If H. Allen Smith did indeed have a neighbor who not only played the bagpipe but also *"sang along with it,"* I should think that admiration for such a miraculous talent would transcend Mr. Smith's dislike for the instrument.
R. J. Powers
Shreveport, Louisiana

Dear Sir: H. Allen Smith reminded me of the definition of a gentleman: "one who can play the bagpipe but doesn't."
Marshall H. Roberts jr.
Fletcher, North Carolina

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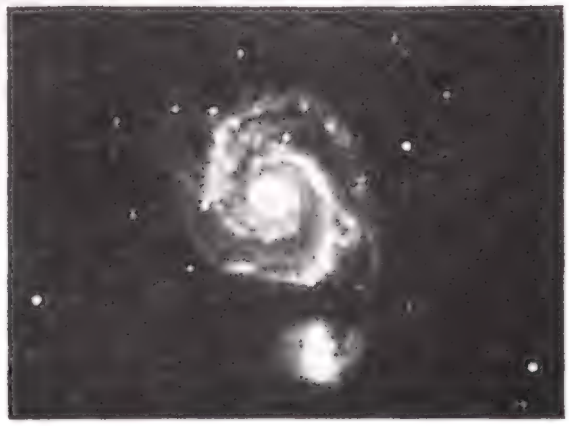

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Columbus' bones

Dear Sir: Your article about the bones of Columbus, in the October issue, reminded me of an episode in my father's naval career which he described in the August 1959 issue of *Shipmate,* the alumni magazine of the Naval Academy. He wrote that in 1911, while he was a lieutenant aboard the USS *North Carolina,* he visited the Cathedral of Santo Domingo, learned the story of Columbus' uneasy resting place and actually handled the bones.

He also saw something that your author, Thomas Dozier, does not mention in his article. I quote: "Additional proof of the authenticity of the remains found in the Cathedral of Santo Domingo was provided by an ounce lead bullet among the small pieces of bones in the leaden box; it was known that Christopher Columbus had carried an unextracted bullet in his body throughout most of his life. . . . When the box was opened, I crowded close with the others to peer inside. There I saw a little pile of dust, a few small bones and the bullet.

"Within minutes, an official had removed the relics from the box, and they passed from hand to hand; I was one of those who personally handled them. I recall that I felt the performance a desecration, and it was no great surprise to me later on to learn that public disapproval had caused measures to be taken to prevent a similar violation of propriety.

"Doubtless these very proper precautions have protected the remains in the leaden box in the Cathedral of Santo Domingo since 1911."

This account was by Captain Frederick L. Oliver, USN.

Smith Hempstone Oliver
Washington, D.C.

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Goya, "Why?," The Disasters of War—Reproduced with permission of Prado, Madrid.

Kenneth Clark's new American television series will be less civilized than Civilisation.

Lord Kenneth Clark's new television series is about a group of great artists, some of whom had rather uncivilized views of the civilization they lived in.

It's called The Romantic Rebellion, the first episode of which will be the PBS Special of the Week on January 13.

You'll meet artists like Goya, Ingres, Delacroix, Degas, David, Piranesi, Fuseli, Blake, Gericault, Turner, Constable and Rodin.

You'll learn about the forces that caused many of them to shift, dramatically, away from classical art—moving them, instead, to create a new, romantic art with some of the most powerful visions of terror, madness and divine ecstacy ever put on canvas or cast in bronze.

Watch The Romantic Rebellion.

It's Lord Kenneth Clark's newest, slightly uncivilized contribution to our civilization.

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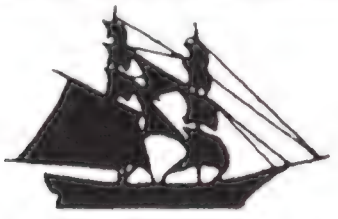

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200 years ago this month

In Parliament, America's friends lose their battle

JANUARY 1775

In London, an aging man, weary with service to his country and drawn from years of painful gout, takes the floor of the House of Lords and delivers a blistering attack on his own colleagues. "Resistance to your Acts was necessary as it was just," he declaims, "and your vain declarations of the omnipotence of Parliament, and your imperious doctrines of the necessity of submission, will be found equally impotent to convince or to enslave your fellow-subjects in America."

The Lords watch the dramatic figure warily. There are a few murmurs of outrage as the speech describes the strength of the Colonial cause, the spirit of the Colonists. That spirit, says the speaker, "which now resists your taxation in America is the same which . . . established the great fundamental, essential maxim of your liberties, *that no subject of England shall be taxed but by his own consent.*"

The House of Lords writhes and glowers as the Earl of Chatham, formerly just plain William Pitt, parades his eloquence on behalf of America. He is the foremost of the friends of America and for years he has hammered home his feeling that the American objection to taxation without representation is simply an expression of British liberty.

Others in Parliament have voiced similar feelings. Charles James Fox, hard gambler and heavy loser, whose £140,000 debt has been paid off by his father, Lord Holland, has long sounded the trumpet for America. He waited until the old nobleman died last summer before switching from Tory to Whig in order not to distress him further. Edmund Burke, a gifted Irishman, has been pouring out his soul (and forging his reputation as an orator) for the American cause. With him, right now, in the House of Commons is the notorious John Wilkes, an on-again-off-again parliamentarian. A decade ago he published some shattering things about the king—he once admitted to a French lady that he didn't know what constituted libel in British journalism, but he intended to find out—and was expelled from the Commons. This set him upon a wave of popularity which he rode to another election. Again he was

Chatham

expelled, and then again he was elected. Now he is allowed to serve—this troublesome man—and has become a sort of unofficial standard-bearer for all liberal movements, happily lionized by the poor British masses and even by the rebellious

Exxon representative takes Newark high school students on a guided tour of facilities at Exxon's Bayway Refinery.

In 10 years, these high school students may help America overcome a major new shortage.

The 1980's. You'd expect them to be years of tremendous technological growth. But they may not be. Because by 1980, the U.S. may face a severe shortage of scientists and engineers—even though we have the talent to prevent such a shortage.

The problem, however, is that much of this talent sits underdeveloped in the classrooms of our urban areas, especially where minorities comprise a major segment of the student body. And yet, this is where new technology could have its greatest impact—both on solving urban problems that need urgent answers—and in helping minority students gain new opportunities for careers in the upper levels of industry.

Unfortunately, many students with aptitudes for successful careers in science or engineering don't recognize their potential. Or if they do, their schools often lack the academic facilities to prepare them for university science curriculums. Exxon is trying to change this situation in several ways.

For example, in cooperation with the National Science Foundation, Exxon recently funded an innovative summer engineering program for high school students in the Newark, N.J. area.

During the six-week program, conducted at the Newark College of Engineering, the students held classroom chalk-talks; went on fact-finding field trips; analyzed the data on a computer and formulated theoretical engineering solutions to problems facing Newark today. These included problems in transportation, recreation, housing, sanitation and pollution.

While it's impossible to say how many of these students will eventually pursue careers in science and engineering, it's a fact that they all expressed more interest in these fields after the program. Next summer Exxon will be back in Newark. Until then, we'll continue our other programs to aid and promote engineering.

We'll again be working with the National Academy of Engineering to identify the critical factors limiting the enrollment and retention of minority students in engineering. We'll also be funding new engineering programs for minorities at 15 major colleges and universities—and helping to strengthen the engineering programs at predominately minority schools, such as Howard University, North Carolina A&T, Tuskegee Institute, Prairie View A&M, Tennessee State University and Southern University.

If we can help it, engineers and scientists are one shortage this country isn't going to have. We believe giving minority students equal opportunities in these fields is the way to prevent it.

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MIDDLE EAST
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Americans. He is a strange man, Wilkes, a handsome lecher not above printing a bit of pornography on the side, but pleased to be a figurehead for liberty.

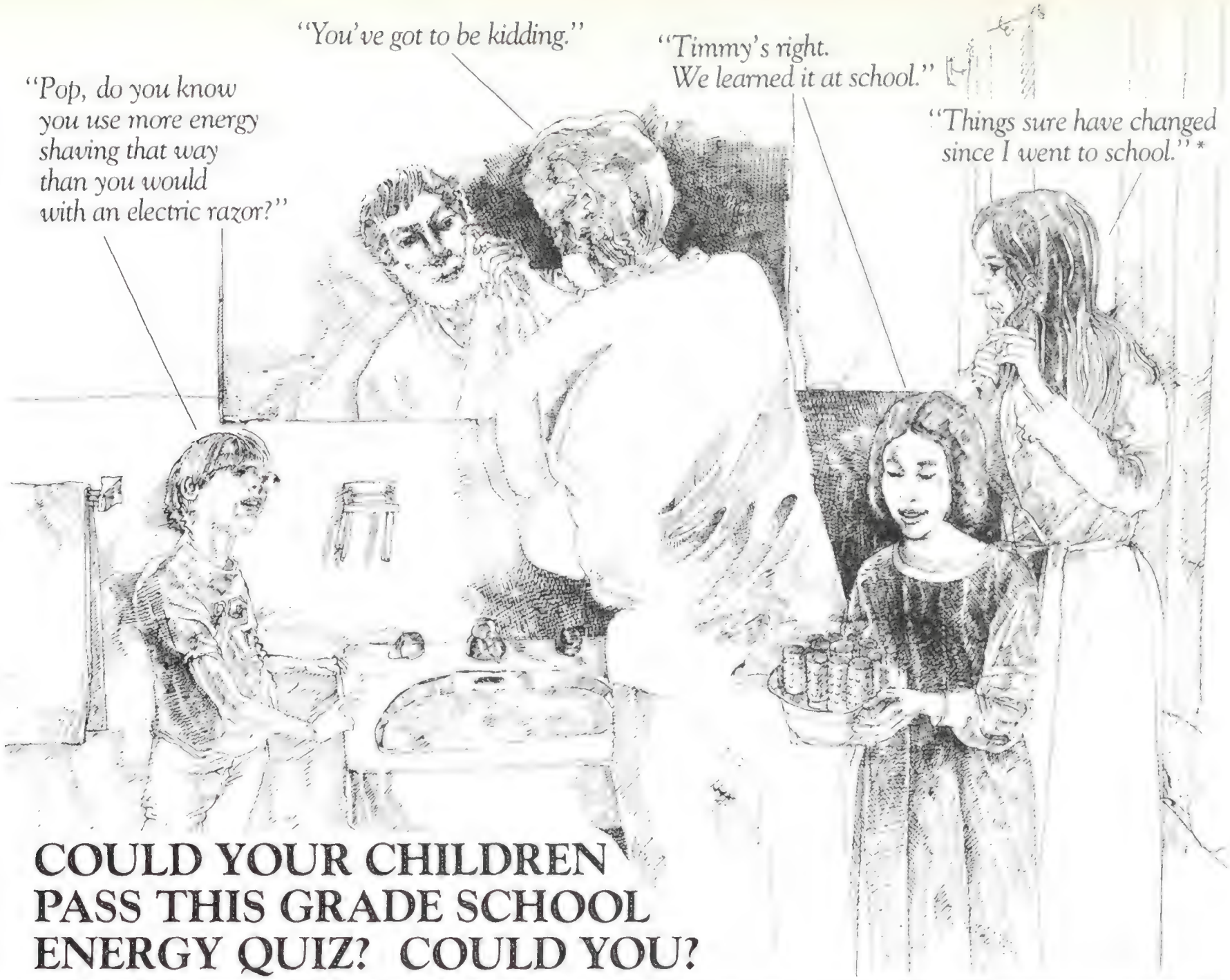
Even some of the professional soldiers in Parliament have expressed their sympathy for America and their concern for keeping the peace. When General William Howe ran for a seat a few months ago, he stated that he would not take up arms against the Americans unless ordered to directly by the king himself. And General John Burgoyne, the playwright whose *Maid of the Oaks* is now so fashionable, has gone on record that "we can bind the American Colonies to us only if we treat them with the honor and respect due a son who has grown to manhood. . . ." "Gentleman Johnny" Burgoyne is 53 this month and he flinches at the risk to his career of taking Howe's stand, but he lets it be known that the

Wilkes

delicate health of his wife (whom he sincerely loves, despite all his dramatics) precludes his leaving her side except in the direst emergency.

In the House of Lords, the Marquis of Rockingham, the Duke of Richmond, Lord Shelburne and Lord Camden share with Lord Chatham the defense of America. They support him in his January 20th speech, calling for the removal of troops from Boston. Says Richmond, "No people can ever be made to submit to a form of government they say they will not receive."

But no friend of America is as true as Chatham, nor as forceful. Nor, perhaps,


"You've got to be kidding."
"Timmy's right. We learned it at school."
"Pop, do you know you use more energy shaving that way than you would with an electric razor?"
"Things sure have changed since I went to school." *

COULD YOUR CHILDREN PASS THIS GRADE SCHOOL ENERGY QUIZ? COULD YOU?

1. The average American uses ☐2 ☐4 ☐8 times as much energy as the average person in the rest of the world.
2. Which gives you more light from the same amount of energy: ☐one 75-watt bulb ☐three 25-watt bulbs?
3. The most abundant energy resource in this country is ☐natural gas ☐coal ☐oil.
4. Most gasoline in the U.S. is consumed on car trips of ☐under 5 miles ☐5 to 10 miles ☐over 10 miles.

Chances are, when you were in school, nobody asked questions like these. Because nobody thought the answers were important.

But children today are facing an increasingly energy-conscious, environment-conscious way of life. They must have the answers. And the sooner the better.

One promising approach to energy education is a pilot program for elementary and secondary school students developed by the Bolton Institute of Washington, D.C. The idea is to get youngsters involved in energy-saving activities at home and through community workshops. It is being tested now in the New England states.

But there's much more to be done. Energy education needs the support of all of us to really take hold. That means community leaders, business people, teachers—and parents.

We're offering two booklets we think you and your children will find stimulating and fun: "Energy Conservation Experiments You Can Do", published by the Thomas Alva Edison Foundation; and "The Energy Challenge: What Can We Do?", published by Energy Conservation Research. For copies, write Conoco, Dept. C55, GPO Box 29, New York, New York 10001. And if you'd like to know more about the Bolton program and how it might be applied to your community, write directly to the Bolton Institute, 1835 K Street N.W., Washington, D.C. 20006.

Answers to quiz:
1. 8 times. **2.** One 75-watt bulb. **3.** Coal. **4.** Under 5 miles.

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B				x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
C	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
D	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
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as warmly human. On the 18th, two days before he takes the floor, he gets a worried note from his wife, Countess Chatham, enjoining him to keep windows and doors closed before his appearance in Parliament, "that you may not be *made* to catch cold."

"For God's sake, sweet life, don't disquiet yourself," he answers; and goes on to say, "If gout does not put in a veto, which I trust in Heaven it will not, I will be in the House of Lords on Friday, then and there to make a motion relative to America. Be of good cheer, noble love—

'Yes, I am proud—I must be proud—
to see
Men not afraid of God afraid of me.'

Look fresh and merrily to-morrow, and I will *look* to the doors and windows."

And so he beseeches and warns and thunders on the 20th: "To conclude, my Lords: If the Ministers thus persevere in misadvising and misleading the King, I will not say that they *can* alienate the affections of his subjects from his crown; but I will affirm, *that they will make the crown not worth his wearing*—I will not say that the King is betrayed; but I will pronounce *that the kingdom is undone.*"

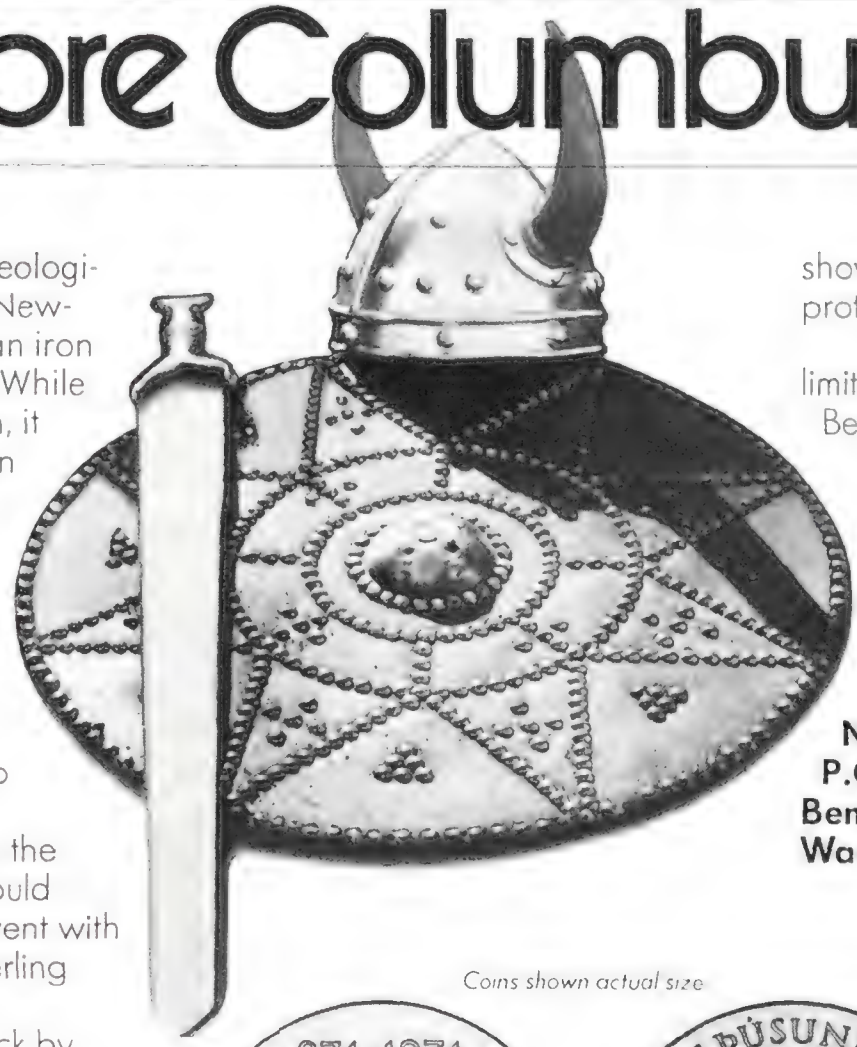
It is, of course, no use. Chatham's motion garners only 18 votes. Against it, King George's angry supporters in the Lords line up 68. Chatham's son, William Pitt the Younger, writes his mother, "The Ministry were violent beyond expectation, almost to madness."

Beyond Parliament, American affairs cause a few ripples, but no big waves. Samuel Johnson is basking in the author's euphoria that follows publication of a book—in his case, *Journey to the Hebrides* is at last off the press. Glowing with gratification, he writes Boswell, "I am going to write about the Americans."

Boswell knows how his famous friend feels about the Americans, yet is compelled to state his opinions. "I am ashamed to say that I have read little and thought little on the subject of America," he writes from Edinburgh. He ventures that "our government has been precipitant and severe in the resolutions taken against the Bostonians. Well do you know that I have no kindness for that race. But nations, or bodies of men, should . . . have a fair trial. . . ."

On January 28, Johnson replies, a little grumpily, "You sent me a case to consider, in which I have no facts but which are against us, nor any principles in

It's quite possible that they got here before Columbus did.



Runic inscriptions, archeological evidence discovered in Newfoundland, the remains of an iron smelter in New Brunswick. While no one is sure exactly when, it is certain that the Norsemen reached North America in their long dragon-prowed ships long before Columbus landed.

We do know that one Ingolfur Arnarson and his brother reached Iceland in 874, exactly 1100 years ago this year.

It is fitting therefore that the Central Bank of Iceland should have chosen to mark the event with a special limited issue of sterling silver coinage.

The issue has been struck by the British Royal Mint in proof quality to a standard of ·925 pure silver. The dies have been specially polished and the blanks struck with extra firm pressure to show the designs to best advantage.

A Bull, a Bird, a Dragon, a Giant

In Icelandic mythology the country has four guardian spirits; a bull, a bird, a dragon and a giant. They protect the land from invaders. Now, these protective spirits have been woven into a beautiful design to form the common reverse of both coins in this limited Icelandic anniversary issue.

The coins themselves

They are two in number and in the denominations of 500 and 1000 kronur. They depict two of Iceland's traditional legends.

The 500 kronur coin is 35 mm in diameter and weighs 20 grams. The obverse depicts a woman leading a two year old heifer. By tradition, the distance she could cover between dawn and sunset was the boundary of her land.

The 1000 kronur coin is 39 mm in diameter and weighs 30 grams. The obverse depicts two settlers staking their land claim. A man lit a fire at sunrise, walked all day and lit another at sunset. The distance between the two fires marked the boundaries of his territory.

The Icelandic Anniversary Set

The two coin Icelandic proof set is handsomely packaged in an elegant presentation case which shows the set to advantage and protects it as well.

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which to reason. It is vain to try to write thus without materials." So much for *that.*

The ripples do not extend across the English Channel. French peasants go hungry while their king hunts and their queen plays. Yet the ideas of the French *philosophes* influence other peoples in Europe. There are stirrings in Poland, even though that nation was so severely carved up three years ago, among Russia, Austria and Prussia, that little of it remains. In Sweden, King Gustavus III is trying an enlightened despotism.

Burke

And in Germany, Frederick the Great is seeking respite from the almost endless string of battles and treaties that have marked his rule.

Yet the military tradition is powerful among the German states. All maintain their small professional armies, and all are willing—even eager—to sell the services of their soldiers to whomever requests them. There are rumors that King George of England—George the Hanoverian—is contemplating the purchase of some mercenaries for some possible Colonial duty. He is, they say, eyeing Catherine the Great's troops in Russia. But there is always a good chance that he will turn toward his ancestral home, the Fatherland, for the kind of military professionals that he knows will be supplied.

Across the sea, Thomas Paine, lately arrived from England, turns 38 years old. In Connecticut, Benedict Arnold is 34. And in Boston, Paul Revere marks his 40th birthday.

EDWARDS PARK

Next month: Old problems for New Spain

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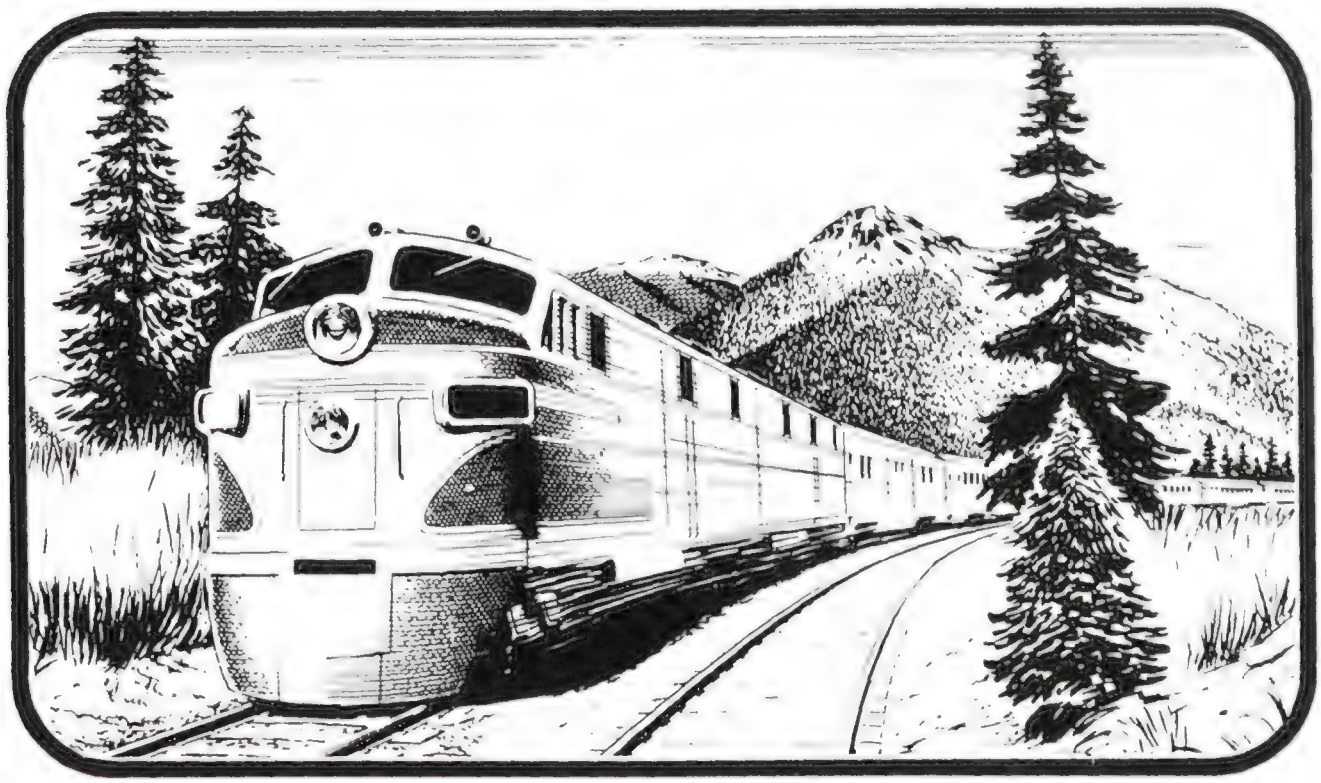

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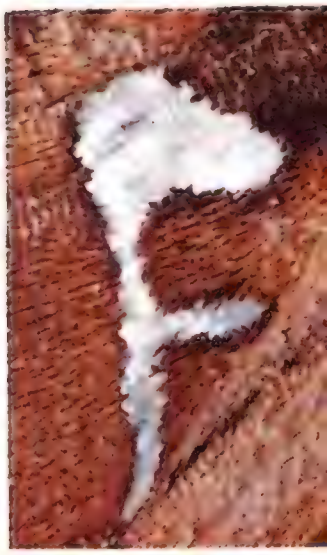
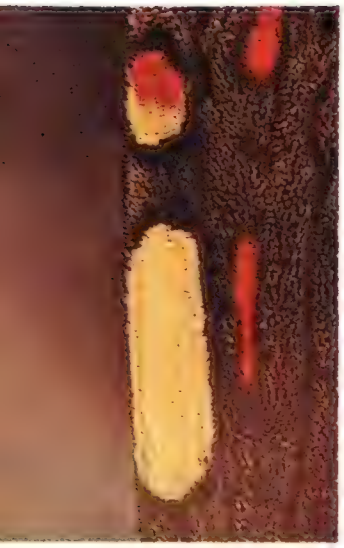
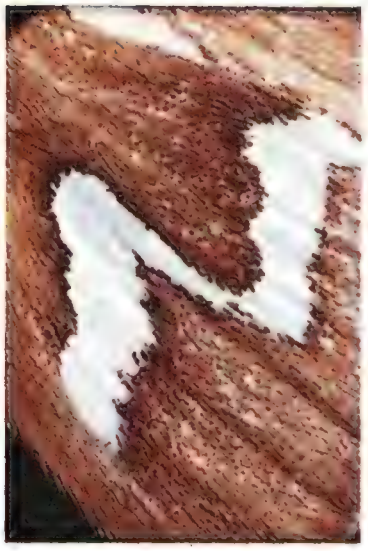
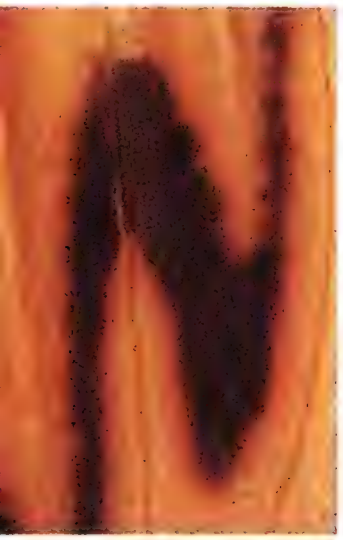
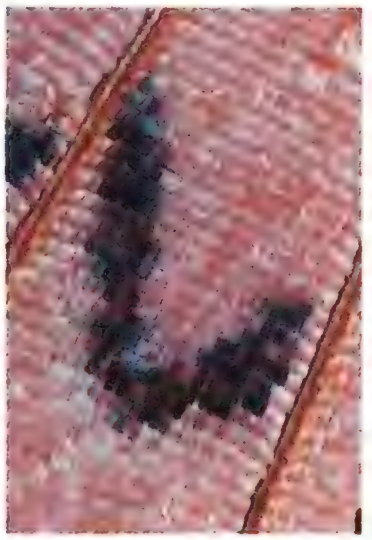
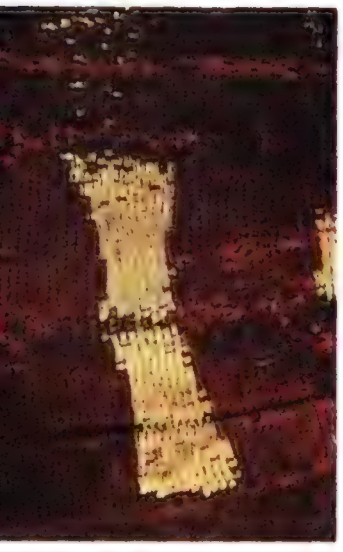


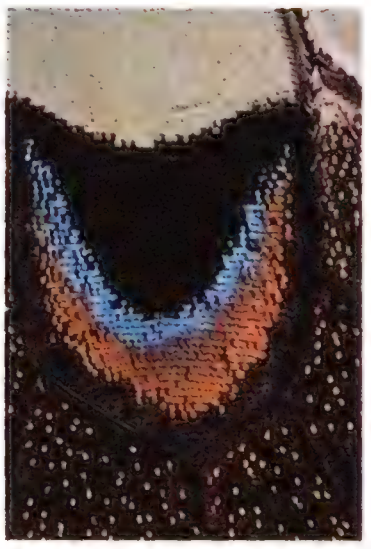
Look—and then look more closely

To reproduce the line above from American poet Theodore Roethke's *"The Far Field"* required innumerable experiments over eons of time. For each letter has been etched into the wing of a moth or a butterfly



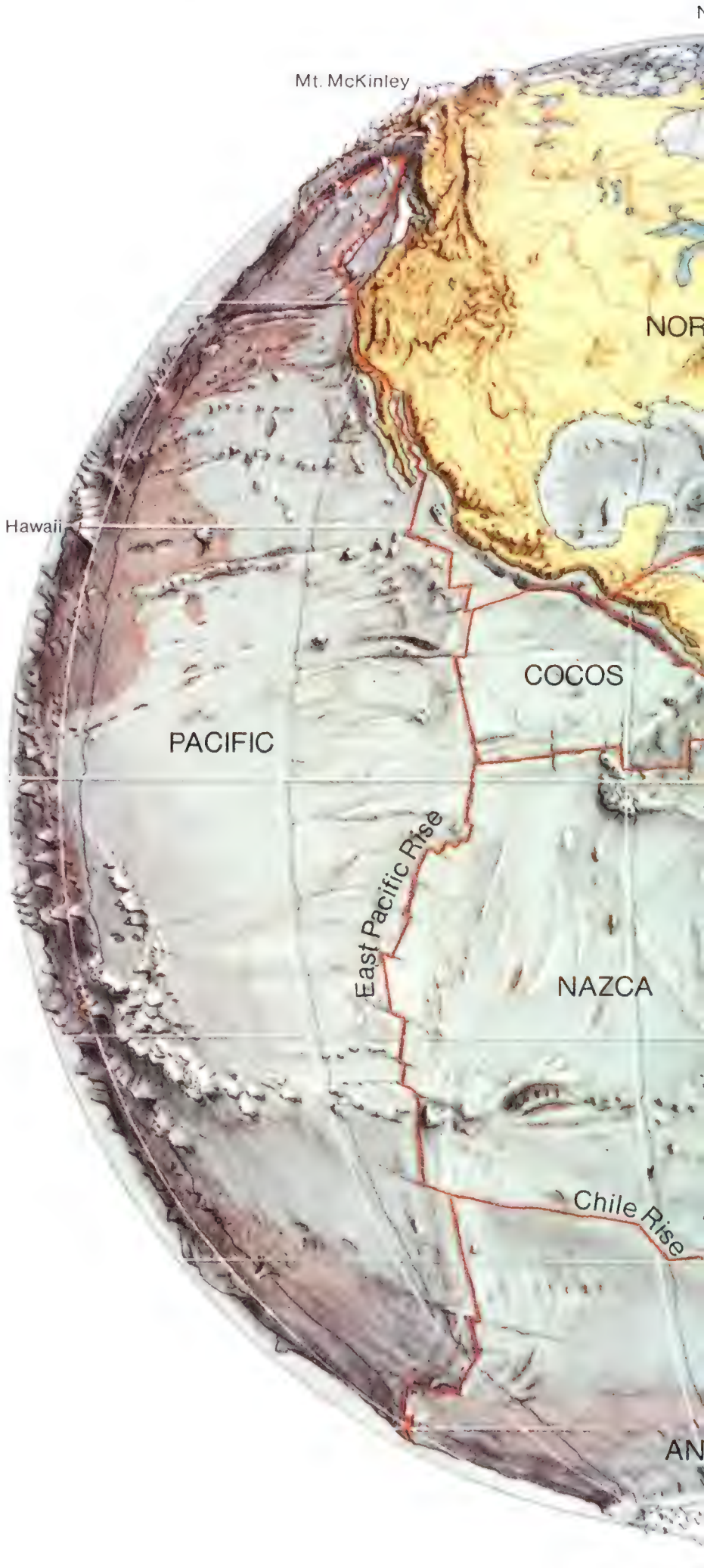





through a never-ending series of trials and errors known as natural selection. No one knew the letters could be found there in the wings until Kjell Sandved, staff photographer for the Smithsonian's National Museum of Natural History, perceived them. Imagine, then, what else there is to be seen in the wing of a moth, or the water above a sunken tree, or in the memory of a single person.

A revolution called plate tectonics has given us a whole new Earth

In a single extraordinary decade geologists answered their own hows and whys with one elegant, all-encompassing explanation



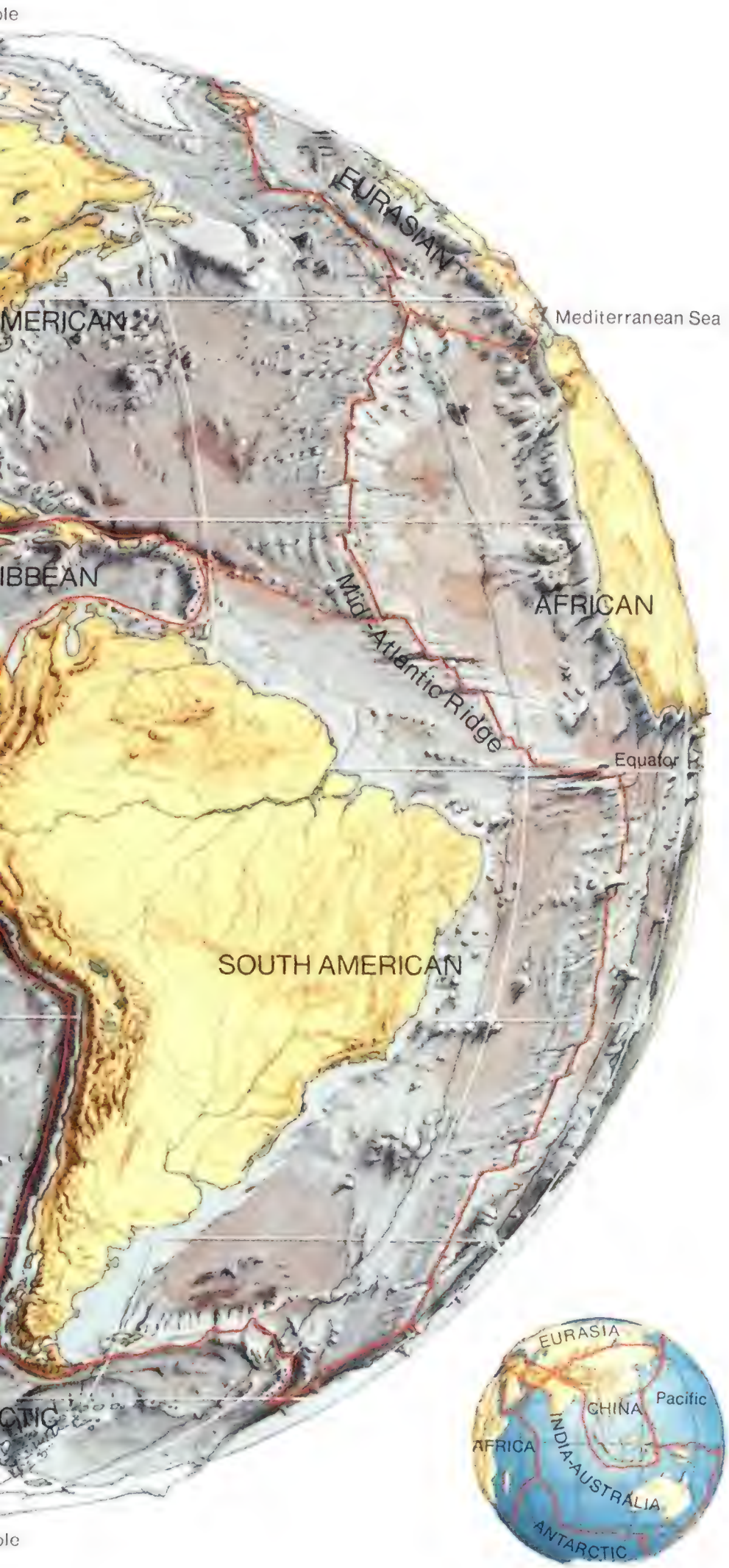
In many respects, the very large is harder to discern than the very small. The elephant's fleas, intimate as they may be with their subject, no doubt have troubles putting together a good mind's-eye view of elephant-in-the-round. Similarly, the scientists who study the Earth have for centuries climbed and poked about with rock hammers, sampling and cataloguing endless varieties of rocks. But until recently they had little more idea of why any of those rocks were found where they were—or, for that matter, why there were such things as rocks or mountains or continents or earthquakes—than the fleas have ideas about the whyness of any elephant. Until a few years ago, in short, the state of the earth sciences was comparable to the state of chemistry before the theory of the atom or to biology before evolution and genetics.

In less than a decade the earth sciences have been altogether shaken up by one of the most rapid, thorough and potentially practical revolutions in the history of science. Instead of being a lifeless ball of miscellaneous materials in happenstance formations, the Earth has jumped into focus as an intricate mechanism with interlocking movements that encompass the surface and extend deep into the interior. This theoretical insight, which goes by the term "plate tectonics," is already serving as a penetrating beam to light up the musty cellars that geoscientists formerly inhabited.

The heart of the new theory is the realization that terra firma is really a dozen or so thin, rigid plates covering our planet like the cracked shell of an egg. Though these plates adjoin each other, they are also in constant, restless motion, thrusting, grinding and overriding one another like ice floes in an Arctic sea.

The history of the evolving new theory is fascinating for what it tells about the tantalizing pull and tug by which evidence gets molded into theory. Since the crude maps that came back from the voyages of dis-

By Tom Alexander
Illustrations by Richard Edes Harrison and Antonio Petruccelli



covery of the late 1500s, men had noticed the appearance of a match-up between the coastlines of the New and Old Worlds. They seemed to run parallel to one another in a sweeping S-shaped curve stretching from the Arctic to the southern tips of Africa and South America. In 1620, Sir Francis Bacon remarked upon the situation as did many others. One great speculator, Benjamin Franklin, even guessed from what he saw that the interior of the Earth might be a "fluid more dense . . . than any of the solids we are acquainted with; which therefore might swim in or upon that fluid. Thus the surface of the globe would be a shell capable of being broken and disordered by the violent movements of the fluids on which it rested."

But the doctrine that prevailed in the earth sciences as recently as the late 1960s was "uniformitarianism," which held, in effect, that the Earth's essential configuration was established shortly after its formation billions of years ago and that about all that had happened since were superficial up and down "breathing" motions, the result of erosion or residual symptoms of the initial cataclysmic formation.

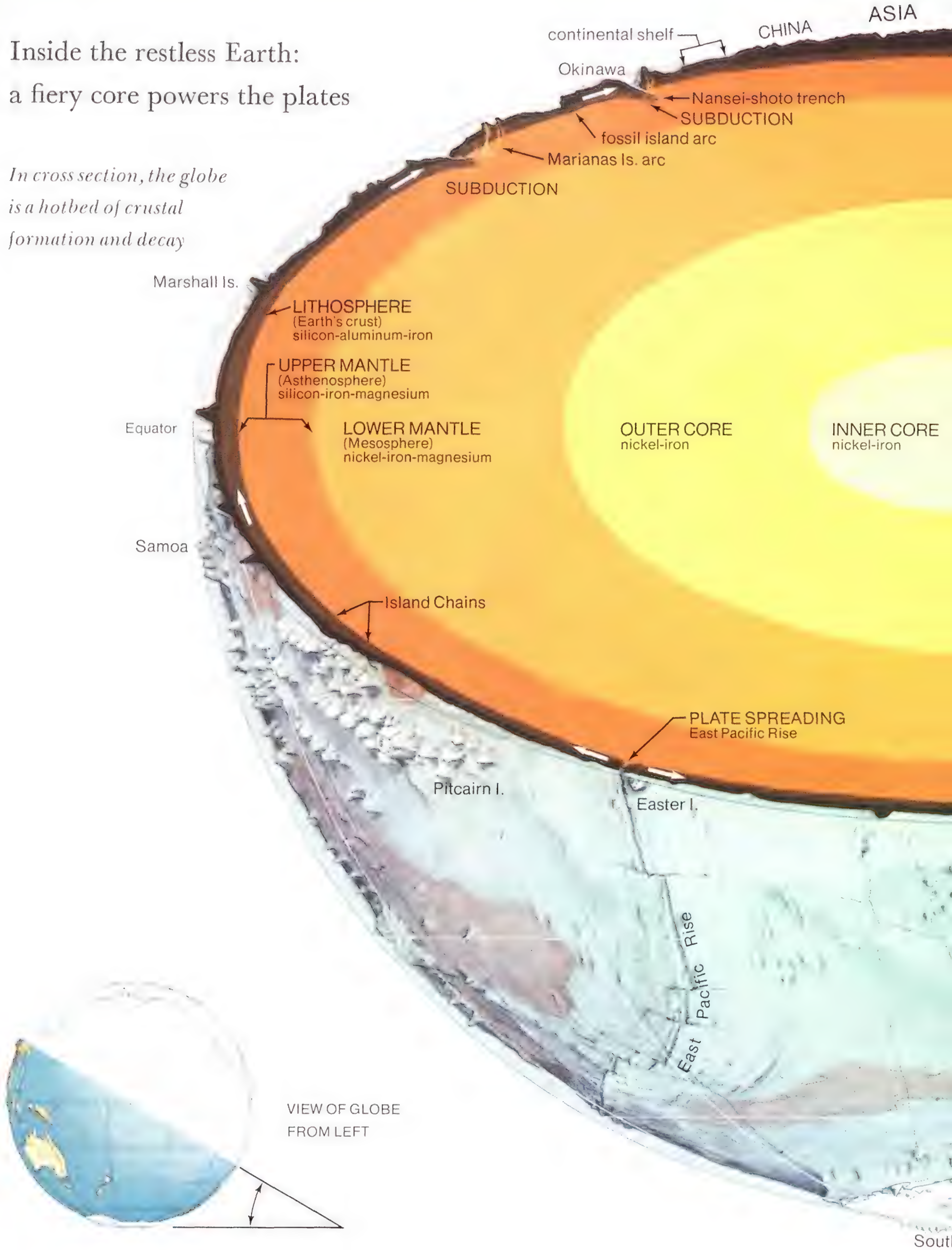
The most indefatigable opponent of uniformitarianism was an assiduous, frequently erratic German meteorologist named Alfred Wegener. Beginning in 1912, he started publishing an amazing variety of data —latitude and longitude measurements, geological and paleontological comparisons, evidence of ancient climatic peculiarities—to bolster his conviction that all the continents were once joined together into a supercontinent that Wegener called "Pangaea." Pangaea had broken apart many millions of years ago and the pieces had been drifting around ever since.

Among other things, Wegener was struck by the peculiar differences between ocean basins and continents. Ocean basins, he observed, are not simply low-lying places where water collects. Rather, even if all the seas ran dry, the distinction between those basins and the continental masses would be the most obvious feature of our planet. For one thing, the oceans are deeper than most people realize; their average depth is around 12,000 feet or two-and-a-half miles. And the continents—counting their underwater "continental shelves" that end anywhere from a few miles to a few

Future schoolchildren may concern themselves most with the salient feature of these maps: not the familiar continents and oceans, but the plates into which the Earth's surface is divided. Here our planet is shown in complete relief; the atmosphere and water have been removed and vertical features are exaggerated by a ratio of 1 to 35. The small map shows the plates on the opposite side of the world.

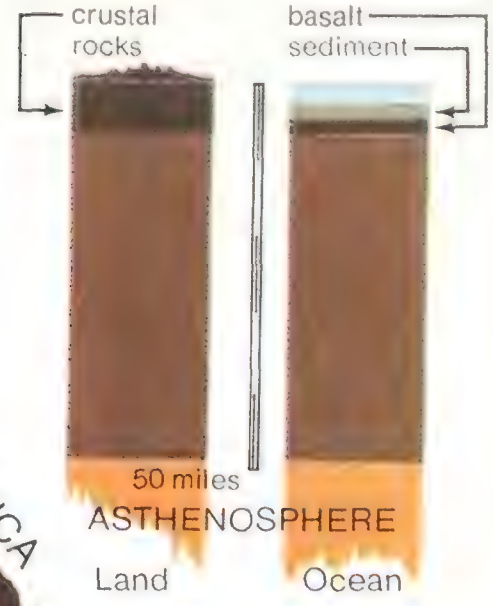
Inside the restless Earth: a fiery core powers the plates

In cross section, the globe is a hotbed of crustal formation and decay



Lhasa
Himalayas
INDIA
SUBDUCTION
subcontinent (India)
collides with continent (Asia)
Bay of Bengal
Red Sea
YOUNG SPREADING RIDGE
concentration of rich metallic salts
AFRICA
temperature 8600°F
density 12
(density of water is 1)
7000°F
11.2—10
5,400°F—2,700°F
5.7—3.3
2,700°F—
2,300°F
1.2
Equator
PLATE SPREADING
Mid-Atlantic ridge
Meridian of Greenwich
St. Helena I.
Martim Vaz
fossil volcano
Mid-Atlantic Ridge
SUBDUCTION
Nazca Plate under thrusts
Andes Mountains
SOUTH
AMERICA
Peru-Chile Trench
Bromley
Plateau
Tristan da Cunha
Escarpment
Falkland
Meteor
Deep
Drake Passage
Scotia Ridge
Pole
ANTARCTICA

Lithosphere in true scale



hundred miles offshore—stick up from these basins like great floating slabs with squared-off sides. It also turns out that the floor of the oceans is a distinctly different substance from continental bedrock. Under their thin layers of soil, continents consist mainly of granitelike varieties of rock that Wegener called "sial" (from Si and Al, the symbols for silicon and aluminum, which are major constituents). Ocean floors, by contrast, are paved with a basaltic rock called "sima" (from silicon and magnesium). Sial weighs only about four-fifths as much as sima. Wegener proposed that continents not only float in the sima but that they move around.

The only mental image that most geophysicists could get from what Wegener said was of great granite icebergs drifting willy-nilly through solid sima seas, and it was a picture they could not abide. Wegener's bête noire was the eminent British physicist, Sir Harold Jeffreys, who used elementary calculations to show that the ocean floor was obviously far too rigid for such goings on; no force imaginable could be shoving lightweight, relatively fragile continents around through solid basalt. In a confrontation with so imposing a figure as Jeffreys, Wegener was obviously outmatched. No matter how convincing his arguments, geophysicists concluded that the German meteorologist was meddling in things beyond his ken.

With hindsight, it is easy to be scornful of Wegener's opponents, but science usually proceeds through this creative kind of tension between two kinds of people. On the one hand are those like Wegener who fix their attention upon obvious appearances. On the other hand there are those who distrust superficial conjecture, especially when it seems to fly in the face of facts that the generations have so painfully winnowed from the chaff of fallacy. As it turned out, Wegener's critics were quite correct: The continents are *not* plowing around through ocean bedrock. On the other hand, they do move.

The discoveries that resolved the paradox of the drifting continents emerged after the development of improved scientific instruments, spurred both by World War II and the tensions of the Cold War. During the war, British researchers on antisubmarine devices developed a supersensitive instrument for measuring magnetism, called an astatic magnetometer. By the early 1950s, the British scientist S. K. Runcorn and his colleagues were taking this instrument about the British Isles, measuring magnetism in rocks. When igneous rocks solidify from their molten state, their tiny grains of iron are magnetized and frozen into alignment with the Earth's magnetic field like compass needles. With the astatic magnetometer, the scientists found that these needles were pointing some 30 degrees away from the present magnetic poles. The implications were that the magnetic poles had moved more than anyone had suspected, or else that the entire British Isles themselves had somehow rotated clockwise.

More important still were techniques that emerged from U.S. defense research. In the late 1950s, for instance, many of the nation's oceanographic institutions were involved in a massive federal program to map the world's ocean floors in anticipation of under-

Some 200 million years ago, the Earth had one ocean (at left above), now the Pacific, and one continent (above right), now split into five.

About 180 million years ago the Sea of Tethys divided the land into two continents.

Later a new split forms four continents plus Antarctica.

sea warfare. New deep-ocean sounding devices were perfected and soundings from oceanographic and naval vessels poured in. As these were translated into charts, a startling new picture of our planet emerged. The sea floor stood revealed as an alien landscape of deep mysterious trenches, endless abyssal plains, strange flat-topped sea mountains. Most startling of all was a continuous 47,000-mile long undersea chain of smooth and jagged ridges that meandered about the entire globe like the seam of a baseball.

The most intriguing-looking section of this ridge is found in the Atlantic Ocean. There, the uplift curves in stepwise fashion so as to remain almost exactly centered and parallel to the continental shoreline on either side. While formerly geophysicists could dismiss the apparent shoreline match as mere coincidence, the emergence of yet another matching feature simply strained coincidence too far.

Simultaneously, the United States had developed a worldwide network of supersensitive seismographs. Beginning in 1960, the seismologists began pinpointing the positions of every earthquake with a small dot on a map. Quickly, the buildup of these dots showed that about 90 percent of all quakes occur along a few narrow belts. These turned out to be not only the known fault lines but also the newly discovered mid-ocean ridges and another geophysical curiosity, the series of deep-sea trenches that rim much of the Pacific.

A tantalizing seismological discovery was that in trench regions the quakes seemed to be generated by events occurring deep inside the Earth. When the seismologists plotted the depths of these quakes, in fact, they fell along planes that sloped downward from the trench bottoms to depths of 400 miles or more beneath the island arcs or the Andean mountain ranges.

Over the years the seismologists have also learned to use earthquake vibrations like X rays to compose cross-sectional pictures of the Earth's interior. Sound vibrations travel more rapidly through a rigid medium than through a soft one. They also reflect when they encounter boundaries between layers of different consistency. By noting reflections and measuring the difference in time required for earthquake vibrations to travel along the Earth's crust, as opposed to more direct routes through the interior, the seismologists were able to deduce that the Earth's interior is made up of concentric layers of varying consistency.

Not counting the patches of continental rock or the blankets of sediment that cover much of the sea bottom, the topmost layer resembles Wegener's hard, brittle crust of sima basalt, although it is only about five miles thick. It overlies a much thicker—60 to 100 miles—but almost equally hard layer called the "lithosphere." Below that is the "mantle" with two layers. The topmost is comparatively soft, about 400 miles thick and called the "asthenosphere." Like all the deeper layers, the asthenosphere is very hot, kept so by the decay of radioactive elements, mainly uranium, thorium and potassium. The heat is trapped by the insulating upper layers. Even though the asthenosphere is at or above its normal melting temperature, the immense weight of the overlying layers of rock compresses it to solid consistency.

Below the asthenosphere is the second layer of the mantle, the "mesosphere," equally hot but even more rigid, having been forced into a dense crystalline phase by the pressure. The mesosphere is about 1,700 miles thick. Finally, there is the 2,700-mile-thick "core," with two layers. The outermost of these is fluid, the inner is hard and both are probably composed of nickel-iron alloy.

Though the research "fleas" had done their work patiently and well, there was still no coherent picture

Tom Alexander has specialized in reporting from the frontiers of science, especially for Fortune. *Richard Edes Harrison, an explanatory cartographer, has produced definitive maps for textbooks and classrooms. Antonio Petruccelli is primarily an artist and illustrator, whose work is often seen on magazine covers.*

Sixty million years ago
India heads for Asia while
Australia goes off map

The Earth at present:
From plate motion now,
we can predict future.

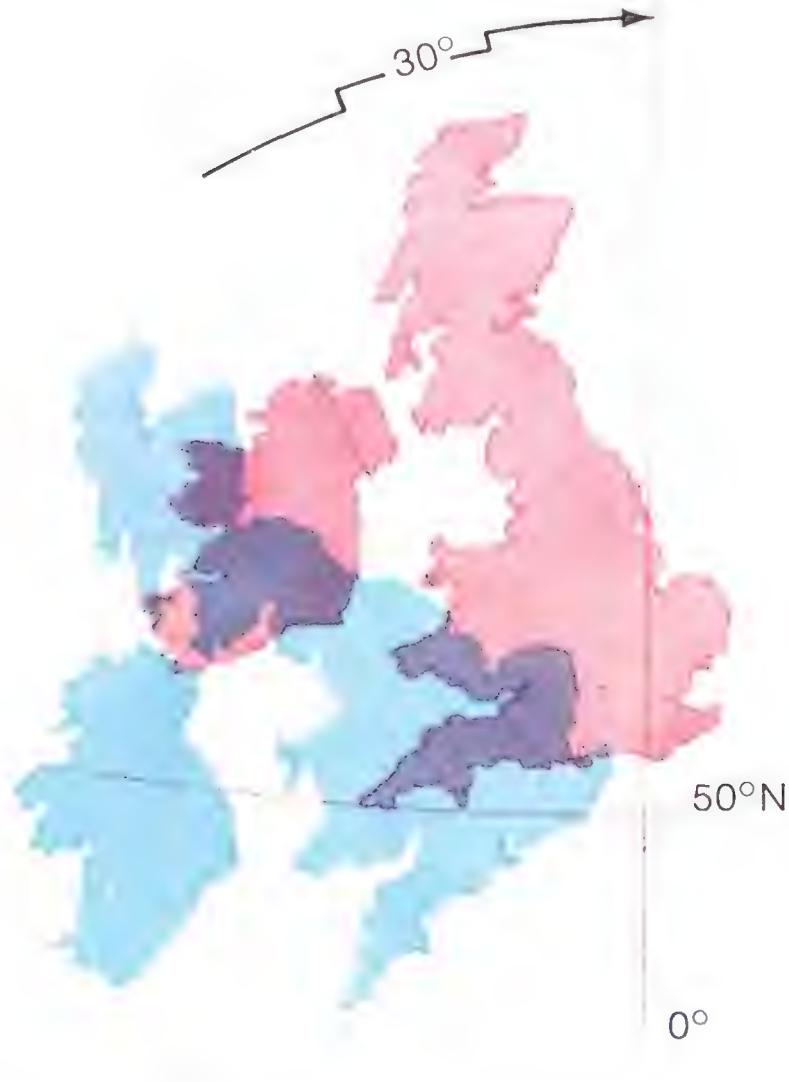
In 50 million years Africa will be split in two
and the Red Sea and Atlantic will widen, left;
a slice of California will head north, right.

Plate tectonics comes of age

of the living elephant by the end of the 1950s. It was time for the speculative fleas. As so often happens, two men emerged to fill the role at about the same time. One was Robert Dietz, a government geologist; the other was Princeton geologist Harry Hess. Separately, they outlined a theory that not only took account of all the new research findings but overcame the geophysicists' objection to Wegener's theory.

Hess and Dietz pointed out that the continents need not be traveling *through* the hard upper layer of crust and lithosphere; they could simply be traveling *with* it. The crucial events in this scenario would occur at the mid-ocean ridges, which would actually amount to crevices in the Earth where hot mantle material wells up. This material would then chill to hardness, welding itself to the edge of the crust-lithosphere "plates" on either side of the rift. Then these plates would move off across the seabed at a rate of one-half to three inches a year, carrying any continents along like logs embedded in sheets of river ice. Dietz coined the term "sea-floor spreading" for the process.

Obviously, such plate-making couldn't continue for long without the Earth getting physically larger—unless, that is, plates somehow get destroyed at the same rate. This destruction, Hess and Dietz surmised, is taking place at these mysterious ocean trenches. As two plates get shoved together and crumpled irresistibly at their edges, one edge may simply jump atop another. When this happens, the overridden plate is diverted downward and goes plunging back into the mantle. Over the course of millions of years, it gets reheated, broken up, melted and finally absorbed once more back into the Earth's interior.

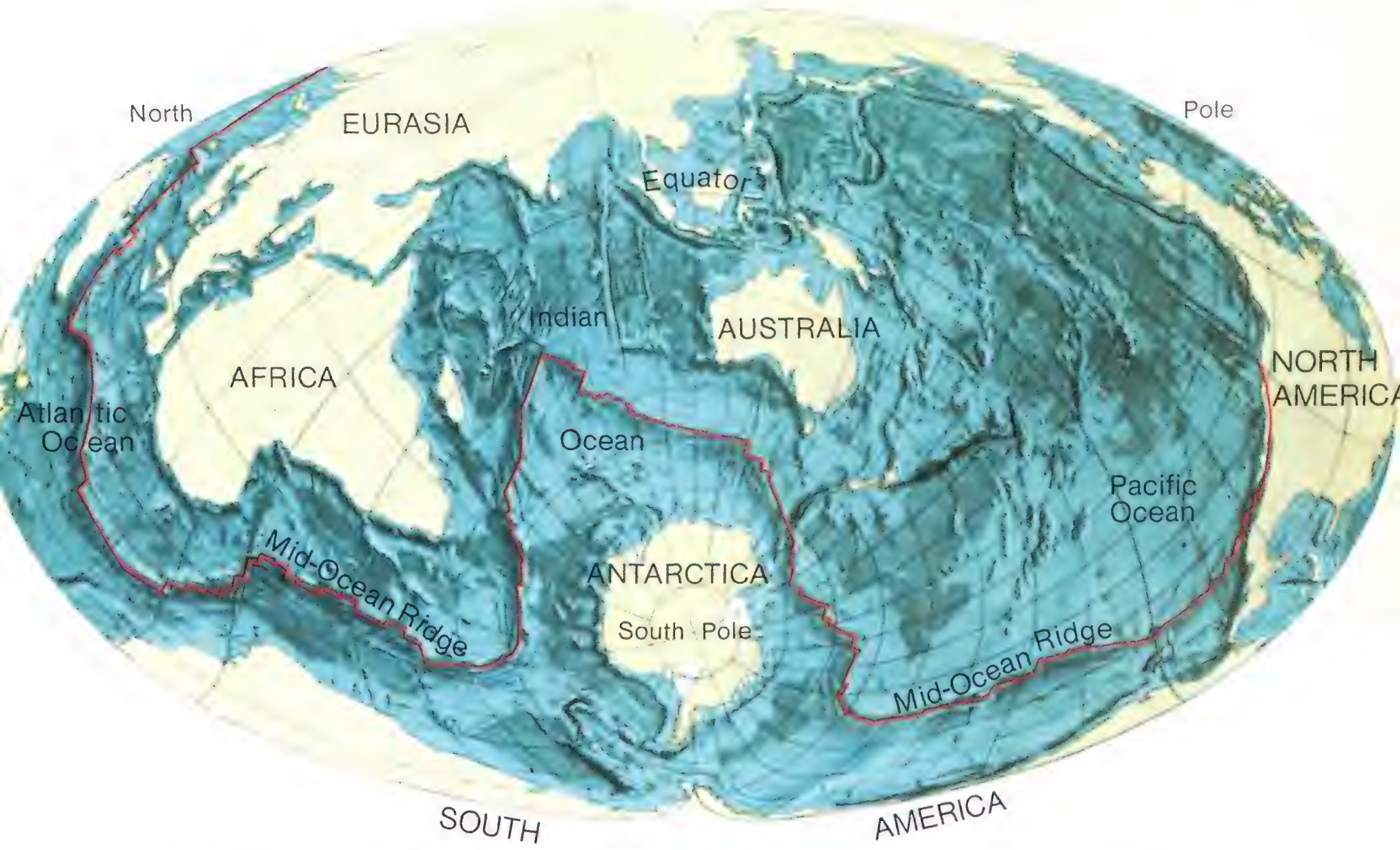


An early clue to continental drift was the discovery that the British Isles have rotated clockwise.

Such a mechanism provides obvious and simple explanations for many geological phenomena. The deep earthquakes in the trench regions are the grumblings of this giant digestive action. The shallow, devastating earthquakes, like those along the San Andreas fault, are simply two plates grinding their edges together, alternately locking and slipping. Many mountain ranges can then be plausibly explained as regions where pressures have crumpled or elevated plate edges.

An elegant proof

These ideas were striking and satisfying, of course, but in science striking ideas are a dime a dozen—and far more common than hard proof. The classical technique for proving such a hypothesis is to predict some consequence that would be hard to account for any other way. Two such proofs of sea-floor spreading quickly emerged. The first was suggested by a 24-year-old English graduate student named Frederick J. Vine, who based his prediction upon the discovery that from time to time throughout the past the Earth has reversed the polarity of its magnetic field; that is, magnetic "north" as indicated by a compass needle suddenly flips over to the south geographic pole and vice versa. Vine reasoned that if basalt is welling up and solidifying at the site of the mid-ocean ridges, it should



The 47,000-mile Mid-Ocean Ridge stands out clearly on "skinned-Earth" (a Briesemeister equal-area projection, modified to concentrate on the oceans). The ridge marks the boundary between major crustal plates and is the source of the new material that keeps them in motion away from the ridge.

retain the magnetic polarity prevailing at the time of its solidification. Therefore, to a magnetometer, the sea floor should appear paved with zebralike magnetic stripes of alternating polarity running parallel to the mid-ocean rifts. By 1964, planes towing airborne magnetometers back and forth across several suspected rifting areas found precisely the pattern Vine had predicted, providing one of the more elegant and striking proofs of a new theory in scientific history.

Later, additional confirmation came from the U.S. Deep Sea Drilling Project, with its ship, the *Glomar Challenger,* roaming the world's seas, probing the sea floor with specially developed drilling equipment. According to the plate hypothesis, it is obvious that those portions of the plate farthest from the spreading ridge should be oldest, and should be overlaid with the deepest layer of collected sediment. One of the *Glomar Challenger*'s earliest discoveries was that the plates in the Atlantic got older and the sediment thicker as the ship drilled farther and farther from the mid-Atlantic ridge.

Hess and Dietz had originally proposed that the force driving this vast machinery is a slow-motion form of convection—the familiar rise and subsequent fall of any heated fluid, like boiling water in a pot or air above a radiator. Some of the convecting mantle material would manage to seep upward through the crack in the sea floor, but the main currents would churn underneath, carrying the plates about.

By now, though, many geophysicists doubt whether convection alone is adequate for the purpose. Some, for example, believe that the only part of the mantle that can convect at all is the comparatively soft asthenosphere. Even though it is solid, it might flow by means of the process known as "creep"—similar to the flow of ice in a glacier. But the asthenosphere is only 400 miles thick, too shallow, some believe, to provide convective energy to move plates.

Not only that, small-scale experiments with materials such as clay and putty show that convection in viscous materials simply never happens in long continuous lines like the mid-ocean ridge system. What happens instead is that the rising materials poke their way up through overlying layers in the form of dis-

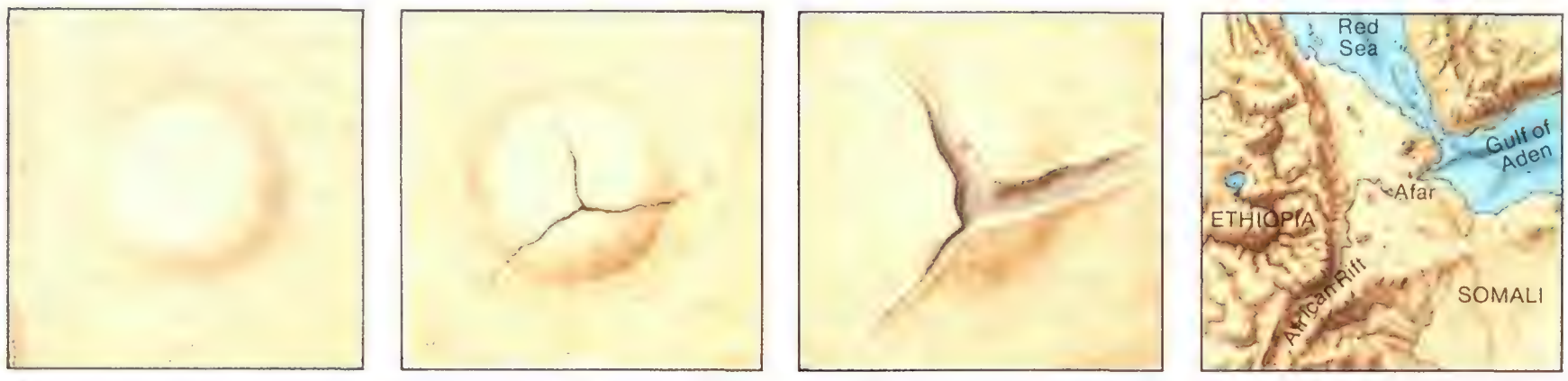
crete, fairly evenly spaced bloblike columns. Such columns, called diapirs, are already well known to earth science. Examples include the salt domes that play an important role in trapping petroleum and the magma flows that emerge to form volcanoes.

Although most volcanic areas are located along mid-ocean rifts or island-arc regions, a few, like the Hawaiian Islands, are located in the center of plates. Pondering these mid-plate volcanoes, the Canadian geophysicist J. Tuzo Wilson concluded that they must be the result of deep-seated diapirs or "plumes" rising at the locations of hot spots. Actually, the present islands are clearly only the latest creation of the same ancient plumes, for extending westerly from Hawaii is a 2,500-mile chain of volcanoes, most of them under water. The volcanoes were obviously stitched into the plate by the plume and they trace the path of the plate as it has moved westward. The rocks in the volcanoes along the chain can be dated through radioactivity measurements and, as expected, the rocks get older the farther west they are.

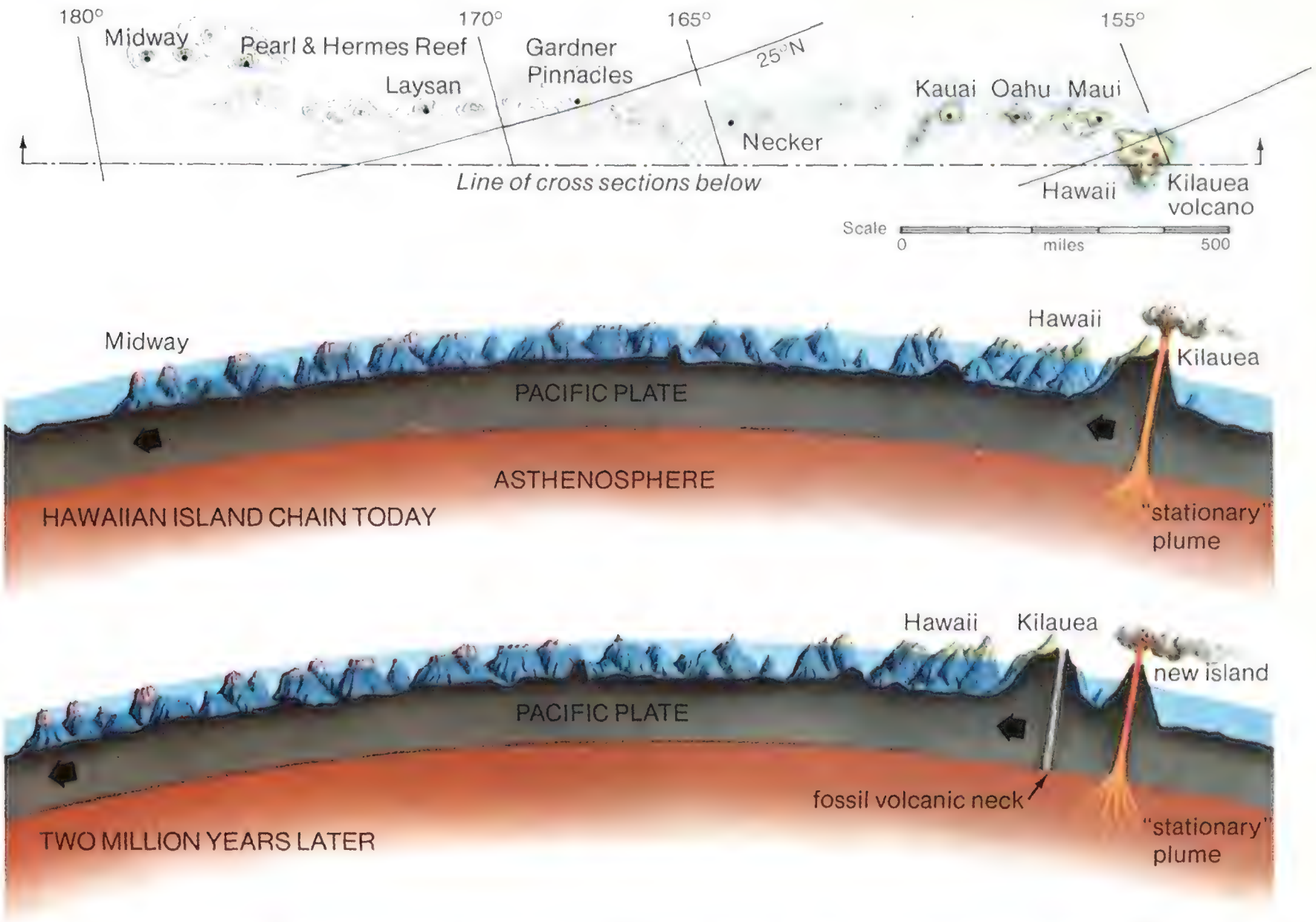
Picking up these and other hints, Princeton geophysicist W. Jason Morgan concluded that perhaps all the plate-driving convection takes place in the form of plumes—great columns up to 100 miles in diameter that Morgan envisions as extending downward into the deep mantle. Morgan, Wilson and others believe they have located the sites of more than 120 presently active plumes, most of them revealed by volcanic islands not far from mid-ocean rifts where plates are known to be emerging. These locations include Iceland, the Azores and the Canary Islands.

In the last two or three years, furthermore, other earth scientists elaborated on Morgan's plume idea. As some see it, when a rising plume starts, it first manifests itself as a bulging dome in the Earth's surface, like the swelling crust of a baking pie. If the bulging action continues, the brittle crust simply splits across the top, usually forming three cracks radiating from the center and spaced about 120 degrees apart. Within the last year or two, two young geophysicists at the State University of New York at Albany, John F. Dewey and Kevin Burke, have spent a lot of time looking at maps and now claim to have found this radiating crack pattern almost everywhere, the remnants of past and present plumes. A newly active example is the "Afar Triangle," a region that intrigues geologists at the juncture of the Red Sea, the Gulf of Aden and the African Rift Valley, each of which may be a crack from the same central plume.

Dewey and Burke further proposed that if several plumes happen to line up sufficiently close, their cracks might join into a continuous line, which would then become the rift where continental splitting and seafloor spreading occurs. According to this idea, the mid-Atlantic volcanic islands are just such a system of plumes, which about 150 million years ago began to split the ancient Pangaean continent as neatly as blows with an ice pick divide a cake of ice. Usually, two of the cracks form the split, while the third goes



A plume of hot mantle material welling up under the Earth's crust first manifested itself as a flat dome. Then the dome splits, the cracks forming 120-degree angles with each other. An example is Afar Triangle in East Africa. Where a line of plumes perforates crust, their cracks may join to form a continuous line.



Island chains are formed by a stationary plume which punches mountains through the crust as it slides by overhead. The map and top diagram show what is happening today in the Hawaiian Islands. Two million years from now, as at the bottom, the plumes may be forming a new island while Hawaii has moved west.

inactive and often shows up later as the bed of a river. Examples of this pattern are thought to exist at the mouths of the Mississippi, Amazon and Rhine rivers.

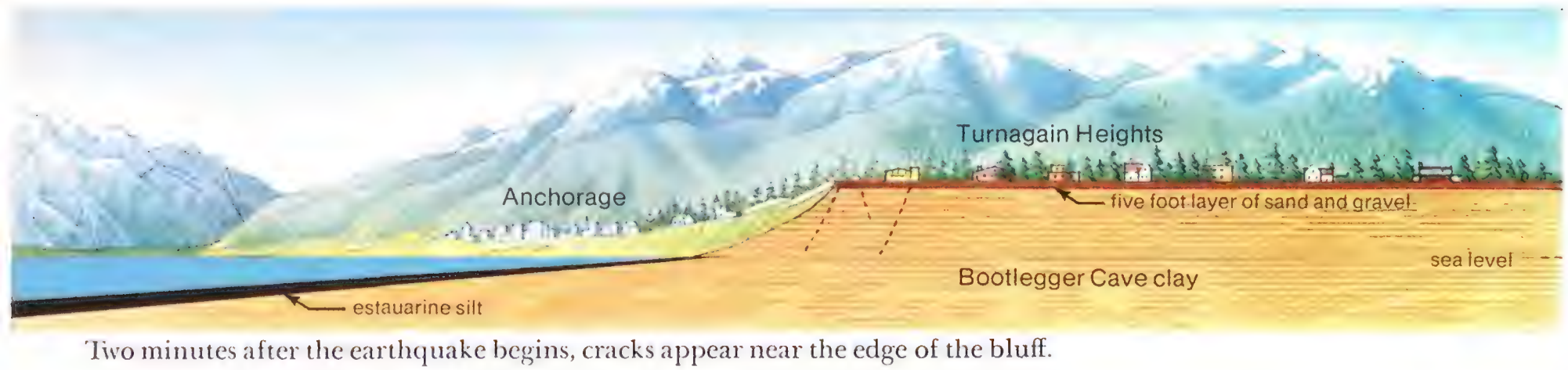
Some geophysicists are still dissatisfied with convection as the energy source for sea-floor spreading and have concluded that "gravity sliding" may be even more important. They point out that the mid-ocean ridges actually amount to great welts in the Earth's surface, bulging upward largely because of the heat emerging in these regions. The plates, therefore, are really poised on a slope, shallow though it may be. While it strains the mind to imagine that plates thousands of miles across are sliding down so tiny an incline, things almost as strange have been found to happen when large masses of earth are involved. During the Alaskan earthquake of 1964, for instance, a 130-acre chunk of a flat Anchorage suburb slid bodily into Cook Inlet. The underlying surface of clay over which the landslide occurred sloped only about 2.5 percent, about the same as formed by the ridges.

The forces of gravity could be augmented by what might be called the "washcloth effect" in the regions where one plate is diving or "subducting" under another. If a washcloth is spread carefully upon the water in a bathtub, it will often seem to float for a time even though it is heavier than water. But the moment one edge dips under, the rest of the cloth quickly slides along behind the dipping edge.

While few earth scientists agree on details, the broad outlines of plate tectonics are established beyond dispute. And even before many of the fundamental theoretical issues are resolved, both scientists and people concerned with economic affairs have already gained numerous insights into things that seem at first glance removed from the behavior of crustal plates. These things include such old puzzles as the origin of mineral deposits or the reasons for the demise of dinosaurs. Another article in next month's SMITHSONIAN will explore some of the theoretical and practical implications of this latest scientific revolution.

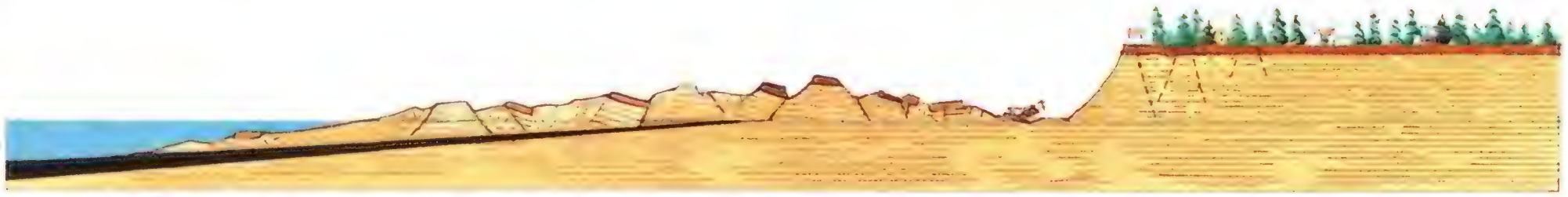
Gravity sliding in Alaska

The Alaskan earthquake of 1964 produced an unusually well-witnessed example of a large amount of earth sliding down a very slight slope. The homes on Turnagain Heights in Anchorage had been built on layers of sand and gravel and clay that overlay estuarine clay at sea level. When the quake hit, more than 120 million tons of clay and soil and gravel slid into the sea. The slope was about 2.5 percent, about the same formed by the raised welts on the Earth we see as mid-ocean ridges. The argument goes that if the entire crust has been thrust upward by upwelling mantle material along the ridges, might not the crustal plates be simply sliding downhill?

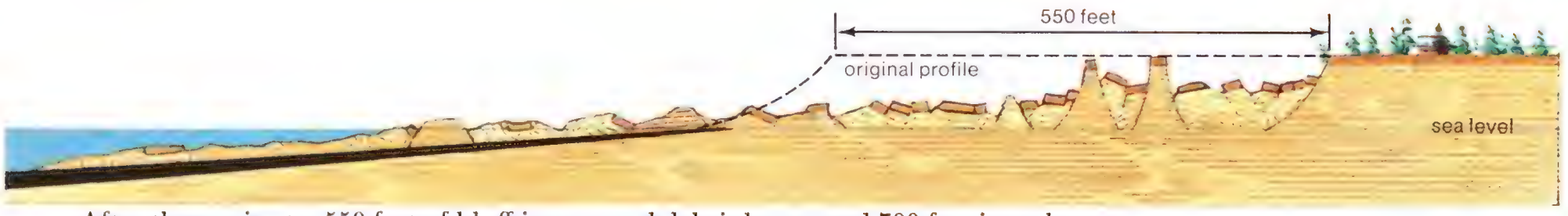


Two minutes after the earthquake begins, cracks appear near the edge of the bluff.

Ten seconds later, a block has slid 250 feet toward the sea.



After 30 seconds the first block has moved farther and more are following.



After three minutes 550 feet of bluff is gone and debris has moved 700 feet into the sea.

Next month: plate tectonics, dinosaurs and Man

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A Coordinator in Materiel Control at our Sparrows Point, Md., steel plant, Joann Jacobs evaluates procedures and methods used to control inventory of electrical and mechanical parts.

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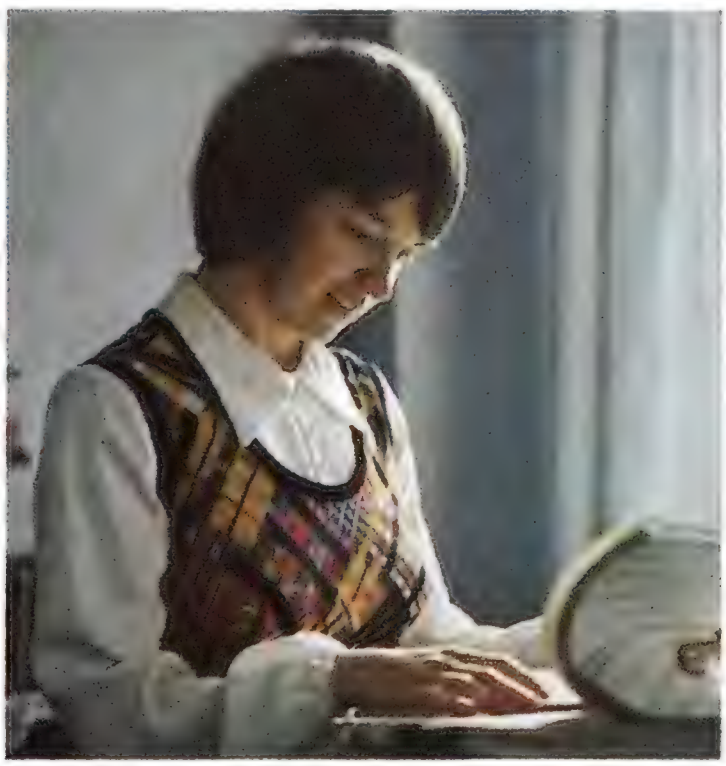

Kathleen Gearhart is a Programmer-Analyst in Bethlehem. Her duties involve programming and systems analysis in technical and engineering applications.

Valeria Fisher is Chief Chemist, Bethlehem Mines Corporation, at Johnstown, Pa. She manages the principal chemical laboratory, and supervises procedures for others.

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By Russell Lynes

From century ago to just yesterday at the Hirshhorn

The paintings in the newest Smithsonian museum encompass all of the American styles and movements of the past hundred years

On the evening in early October when the Hirshhorn Museum and Sculpture Garden held the second of its formal openings, this one for the citizens of the art world—about 5,500 artists, dealers, critics, collectors, curators and their friends—the demand for invitations far outran the number that had been issued. To get past the guards at the entrance one needed a piece of brown-and-white cardboard ("Not transferable," it said), and it was rumored that they were selling for $50 apiece in New York to those whose reputations required them (or so they thought) to be seen at that place on that evening by those people.

There were some young Washington artists who had not been invited and felt left out, and they met the problem head-on with ingenuity and skill. They silk-screened 50 replicas (it would be unfair to call them forgeries) of the ticket and gave them to their friends. This caper came to the attention of Abram Lerner, the museum's director, who, far from being dismayed, was amused. He got the artists who had made the tickets to sign them for the museum's archives. There is, as you can see, nothing stuffy about the Hirshhorn.

When he gave his collection of paintings and sculpture to the nation, Joseph H. Hirshhorn committed an act of modesty so uncommon among collectors as to be remarkable. Modesty is not, indeed, one of the virtues of which this collector, or many others, is often accused, but it is a kind of modesty that comes from an appreciation of the fallibility of taste. The Hirshhorn collection was given in such a way that its trustees can sell any parts of it they may decide to de-accession (currently a dirty word in art circles) in order in their judgment to improve the collection. They can buy, lend, borrow or exchange works—quite different from the rules governing another remarkable collection under the wing of the Smithsonian Institution, the Freer Gallery of Art just a few hundred yards away on the Mall. When Charles Lang Freer gave his collection of Oriental art and turn-of-the-century American paintings to the Institution, along with the funds to build the charming Renaissance palace that houses it, he stipulated that nothing could henceforth be removed from the building, much less sold (works might be added, but only to the Oriental collection and only through purchase). The result is that the painting collection is a static monument to one man's taste at one epoch in the evolution of taste—a splendid monument, to be sure, but a period piece. Art is said to be timeless, and some of it is, but taste is vagrant, fallible and often smug. No one denies that one of the functions of a museum is to protect what is timeless from fashions of taste, but a museum that declares

This haunting portrait of the artist's wife, *Mrs. Thomas Eakins,* was painted about 1899.

Portrait of a Girl in a White Dress (c. 1905) is by Thomas Anshutz, Eakins' onetime assistant.

Photographs by John R. Tennant

itself to be a museum of the modern arts, as the Hirshhorn has, by its very nature adds another facet to its mission. To be modern means to move with the times, though it does not mean to be careless about the past.

Unlike the Hirshhorn collection of sculpture, which is predominantly European, the collection of paintings is primarily American; and the earliest works in the exhibition date from just about the time of the Civil War. The selection made by Mr. Lerner is the result of an uncommonly perceptive screening, not just for quality, but for contrasts that quite undogmatically give a sense of the sweep as well as the depth of the 4,000-odd paintings in the collection.

To start chronologically at the beginning, one goes underground by a long escalator to the floor below the lobby, where there is a cloakroom, a delightful little museum shop, and some rather conventional galleries —conventional, that is, in that their walls are flat, not gently curved like those in the upper parts of the circular museum, and conventionally, albeit imaginatively, installed.

What one discovers belowstairs is by no means the beginning of a survey of American painting from the mid-19th century onward. It is a sampling of good work by good artists with a few real blockbusters. There are, for instance, two charming little landscapes by Bierstadt who liked to paint tremendous canvases of the Rockies; these are as quiet as his big pictures are romantically clamorous. There are four pleasant, small Winslow Homers that will chill few spines, one tiny still life by John Frederick Peto that hints at an agreeable, small talent, and so on. But be warned. There are Eakins portraits, and one in particular, that are as commanding as any paintings in the museum. The particular one is of his wife (p. 42), simply a head and shoulders with a poignancy, clarity and strength and with an analysis of character that makes it, if you will swallow my superlative, a match for any American portrait ever painted. Walt Whitman, who was one of Eakins' friends, said of him in comparison with a fashionable portraitist of the 1870s, "Eakins is not a painter; he is a force." The force is fully evident in the seven portraits by him in the exhibition (though some, compared with the high standard set by the portrait of Mrs. Eakins, seem routine), as well as in a sketch for the head and torso of a crucified Christ which has the kind of uncompromising attack that made Eakins an unwelcome painter in genteel Philadelphia where he lived and worked. In short, he was an artist's artist. Truth to him was observable, and once observed it

Walt Kuhn's *The Tragic Comedians* (c. 1916) was influenced by European cubists in 1913 Armory Show.

Reginald Marsh's celebration of swarming Coney Island: *George C. Tilyou's Steeplechase Park* (1936).

André Masson's *Elk Attacked by Dogs* (1945)—painted during the artist's wartime sojourn in America.

This view of one of the upper-floor galleries shows the gentle curve of the walls and the way in which paintings have been integrated with sculpture. These works are from the 1960s.

was not to be prettied up; it was beautiful enough raw.

When John Singer Sargent, who is represented a few yards from the Eakinses by two glossy portraits (one of Mrs. Kate A. Moore so glossy that it looks like a Boldini), visited in Philadelphia about 1900, he was asked by his hostess if there were any local artists he would like her to invite for dinner. He replied, "There's Eakins, for instance," and the lady asked, "And who is Eakins?"

Eakins had few followers though he had many devoted pupils, especially during the time when he was director of the Pennsylvania Academy of the Fine Arts, a job from which he was fired for insisting on using entirely nude male models in his life classes. One of his assistants, indeed the one who took over from him as teacher and director at the Academy, was Thomas Anshutz. He was regarded as a very great teacher, and a demanding and caustic one; he was known to his students as "a file dipped in acid." If you will compare his uncompromising *Portrait of a Girl in a White Dress* (p. 43) with a Sargent, you will not only understand the epithet but see the extraordinary simplicity with which he could make a statement in paint. It is a picture which charms almost in spite of itself.

The line from Eakins to the group of painters, well represented in the exhibition, known as "The Eight" (and nicknamed "The Ash Can School") is as direct as any line of personal influence in the history of American art. The recognized leader of The Eight was Robert Henri, who studied with Anshutz in Philadelphia. Like Anshutz, he in turn was a great teacher, but unlike him he was an extraordinarily compassionate one. It was not his formal teaching that mattered to The Eight, who had less in common in the way they painted than in their revolt against the smugness of the National Academy; it was his dedicated belief in the importance of independence to the artist. Art lay in the vitality of the city, its noise and squalor and gaiety. This was what art should be made of, not of the formal posings of the studio—or so he preached.

The Eight are characteristically represented in the exhibition. They were called The Eight for no more obscure reason than that all eight of them showed together at the Macbeth Gallery in New York in February 1908, and because the exhibition caused a considerable flurry at the time; it seemed to be a glove thrown in the complacent face of the National Academy. John Sloan, William Glackens, George Luks and Everett Shinn had all been newspaper artists in Philadelphia and had come to New York, at the beckoning of Henri, as the land of artistic promise. Each of them painted the life of the city, indoors and out, mainly out. Arthur B. Davies, Maurice Prendergast and Ernest Lawson joined the other five to flesh out the exhibition, and because they too were disgruntled

Mr. Lynes discussed the new Hirshhorn's sculpture collection in the December issue of SMITHSONIAN.

with what Shinn later called "the effete, delicate and supinely refined" painting of the academicians, "lock-stepped in monotonous parade in a deadly unbroken circle, each canvas scratching the back of the one in its lead." By comparison with the revolution that was going on in European art at the same time, the revolt of The Eight seems tame indeed today.

The Armory Show of 1913 was the first large-scale assault on American taste by the artists who were continuing the Impressionist tradition of tearing up the roots of academic art in Europe. During the decade that preceded it Matisse and Picasso, along with Braque, Gris, Derain and Rouault, had surfaced, and it was a group of American painters led by Arthur B. Davies (whose work looks tame in the Hirshhorn today and probably always did) and Walt Kuhn (whose *The Tragic Comedians*, p. 44, must have seemed outrageous when it was painted in 1916), who brought the new European work to the 69th Regiment Armory in New York. Its effect on the course of American art was initially more financial than esthetic; there were important new collectors converted to the European artists, few to the progressive Americans.

Influences from Europe

American painting continued in the ways it had been going: The polite tradition flowed on in the hands of several painters and in the impressionism of Childe Hassam; it also continued to explore the cityscape at the hands of those urbanists who belonged to The Eight, and such others as George Bellows, Abraham Walkowitz and, most importantly, Edward Hopper.

There were also those whose work was strongly influenced by the rapid succession of movements in Europe, by Fauvism, Cubism, Orphism (abstractions of pure color), by the Expressionism of post-World War I Germany, and by the Bauhaus. Max Weber briefly devoured cubism; Stanton Macdonald-Wright and Morgan Russell devised their own version of Orphism and called it Synchromism. Marsden Hartley felt the impress of post-World War I German expressionism. And there were some who caught the spirit of the modern movement but took off in their own private ways—Demuth, O'Keeffe, Dove, Maurer, Kuniyoshi, Stuart Davis and others too numerous to mention. Most of these and many more, supported by sculptures by their contemporaries and paintings by Europeans like Kokoschka and Léger, are on the lower level.

The upstairs floors have a very different sense of time and space. The galleries seem to slip behind one as one moves through them, the act of walking around the gentle arcs of a circle punctuated by outlets and inlets, by pedestals and passageways and partitions. The spaces themselves provide a pleasing sense of

Queen of Hearts (1943-46) is one of eight paintings by Willem de Kooning in inaugural exhibition.

The Doubter (1937) is by French surrealist Yves Tanguy, who emigrated to the United States in 1939.

being tempted forward without the feeling that one has to make an effort to get to the end of them. These are spaces to move through in a leisurely manner, always with the assurance that one can retreat to rest one's eyes and feet in the inner circle, where the smaller sculptures are, and look down on the fountain in the courtyard.

The exhibition of paintings, accented in many cases by small sculptures and in a few cases by large ones that would not weather well outdoors (like George Segal's plaster *Bus Riders* or Dubuffet's papier-mâché *Oberon*), is arranged chronologically but not pedantically so. That is, it is roughly by decades and not year by year.

There is little, I think, to be gained in this brief article by attempting to make an orderly progression through the galleries, pointing out a splendid painting here and an occasional dud there (there are inevitably some duds), though the visitor will find the chronological arrangement both informative and surprising. It is so convenient to divide art into "periods" that one can forget how many valid and conflicting ideas of art may coexist, how long artists often live, and how radically their styles frequently change. It seems most unlikely that there has ever been a time when there has been such an extraordinary range of styles as there has been in the last 50 years, such a weaving together of what seem to be entirely contradictory esthetic threads into a rich texture.

In the decade from 1936 to 1946 (to be arbitrary) you will find in the exhibition a Coney Island painting by Reginald Marsh, *George C. Tilyou's Steeplechase Park*, fairly squirming with live bodies, and an André Masson abstraction called *Elk Attacked by Dogs* that squirms with calligraphic lines (both on p. 45), and a Ben Nicholson of stark and controlled geometry, just called *Painting*. You will find the surrealist Yves Tanguy (*The Doubter*, p. 47), the abstract expressionist Jackson Pollock (*Water Figure*), the neo-romantic Eugene Berman (*Nike*).

Six canvases by Kenneth Noland hang on pull-out panel in the museum's efficient storage area.

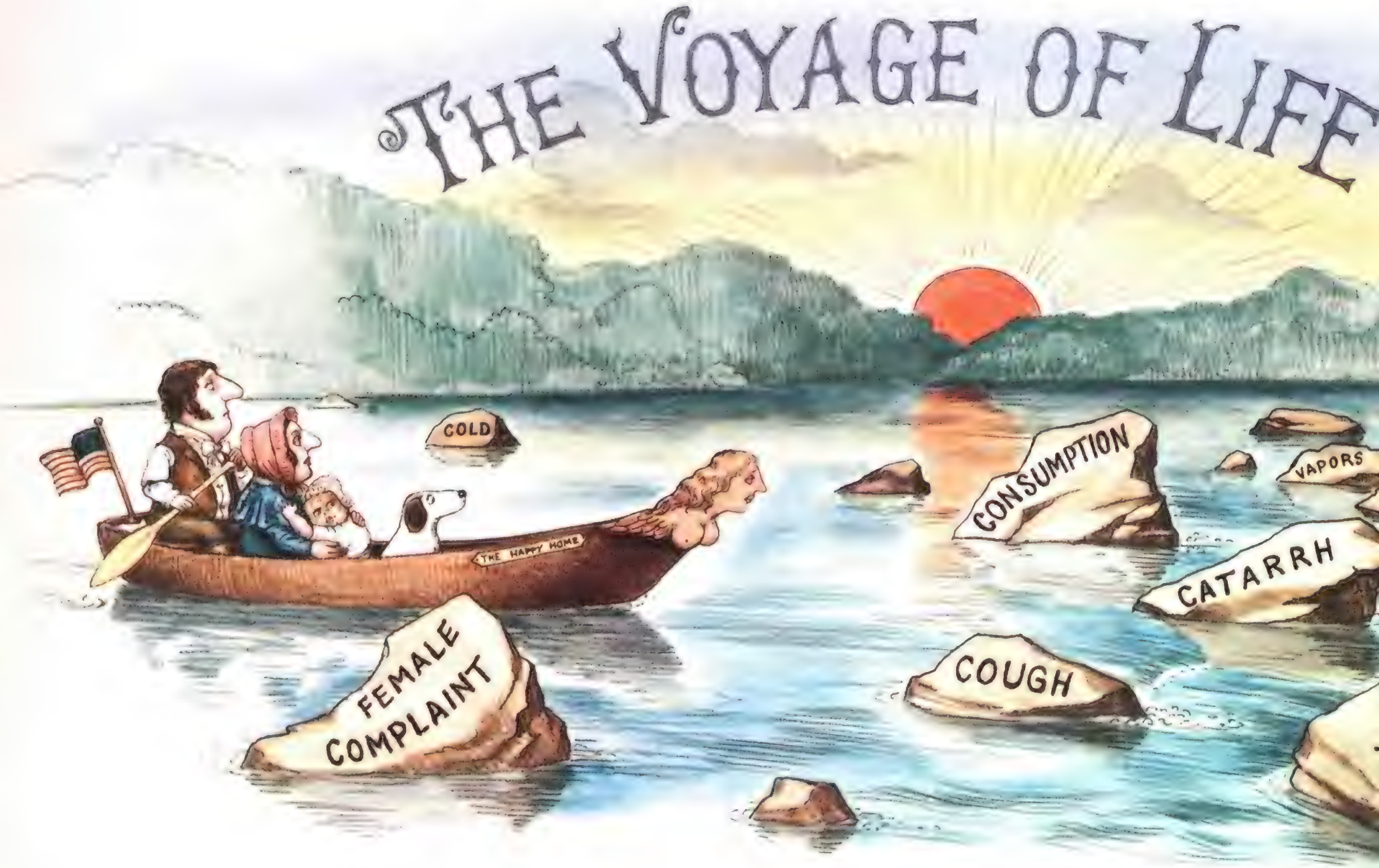
Nowadays every artist, it seems, has an invisible tag, belongs to a school, is pigeonholed; such is the nature of 20th-century art pedantry. The tags mean little, in most cases, to the artists themselves, who are trying to solve their own intellectual and esthetic problems, not trying to form a cell or mount a bandwagon. Such tags make paintings easy to talk about, easy for the dealers to buy and sell, but not easy to love or hate. There are no such tags on the paintings in the Hirshhorn, though the labels of course have dates as well as titles. Despite what I have said, there may be those who will find something artificial about grouping paintings by decades rather than according to what the pictures might do for each other, or say about each other by juxtaposition. But it is silly to quibble. Let it suffice to say that they have been installed with great skill.

A remarkable score

The Hirshhorn is not a collection of modern art in the same terms (or the same league) as the collection of the Museum of Modern Art, except for its sculpture. It is, as I have said, largely American with relatively few examples of European paintings, and not all of those are examples of top quality. Its strength is in its vigor and variety, in the catholicity of Mr. Hirshhorn's taste and in the fallibility as well as the acuity of his eye. He is a man, not a committee, and according to his critics he has not always spotted quality the minute it appeared. (They complain, especially, about his relatively late conversion to Jackson Pollock.) But his score is remarkable nonetheless. You will not find a de Kooning anywhere better than his *Queen of Hearts* (p. 47) or a Franz Kline superior to his *Delaware Gap* or a Mark Rothko to excel his *Blue, Orange, Red* (opposite)—or so it seems to me. You will come on to Pop, Op, Color Field or New Realism at about the time your feet give out and your eyes go bleary. If, that is, you have started as I did in this article with the paintings of the last century at the bottom of the museum and worked your way to just yesterday in the top circle.

Only the ignorant, the greedy or the insatiable will attempt to sample this buffet all at once. The choices are staggering, the richness of the dishes surfeiting. But there is satisfaction in knowing that it will be there for a long time and, what is more, that all of it belongs to all of us.

The late Mark Rothko's *Blue, Orange, Red* (1961)
is a typical example of his mature style.



By Sisley Barnes
Drawings by Mike Ramus

Medicine shows duped, delighted

Charlatans all, the potion peddlers gulled all with Indian nostrums and sex restoratives but turned the fraud into fun for the family

"I have been troubled for the past year and a half with a disease which baffled the doctors, and not one of the many who treated me could bring relief. I finally bought and took one 25-cent box of Kickapoo Indian Worm Killer; and soon enough, to my great astonishment, I passed a tape-worm of some size, it measuring, head and all, a full fifty feet. . . ." So went the outstanding testimonial of one Silas Harcourt of Midland, Michigan. Perhaps his gargantuan tapeworm was one of several among the grisly exhibits seen years ago in New Hampshire, where a Kickapoo Indian Medicine Show played a one-week stand.

America's potion peddlers with their old-fashioned medicine shows have been with us for more than 200 years. Enterprising peddlers saw the wisdom of taking medicine to frontier people who had only their own unreliable remedies for emergencies. Over the decades, thousands of "doctors" took to the road in gaily painted wagons with their own prescriptions to sell to the locals.

The entertainment was modest at first: perhaps pie-eating contests, footraces, target shooting. Usually the

good doctor could play the banjo and sing. As competition increased, entertainment expanded to include jugglers dressed in baggy pink satin trousers, gold shirts and turbans; a black poodle walking on stiff back legs, hugging a pink parasol in his front paws; a canary that could sing "The Star-Spangled Banner."

In the early 1820s, before medicine shows reached toward the West, Old Doc Hashalew took to the towpath of the not yet completed Erie Canal and followed its leisurely 15 miles with Hashalew's Elixir of Life. With his kerosene lamp, the trademark of all medicine shows, Doc was in business every night. Because he was an accomplished fire-eater and magician, he became one of the few itinerants to prosper without a troupe.

Some of the more popular prescriptions, peddled by pitchmen who often wore white coats and neat Van Dykes, were made of nothing more than sugar, water and alcohol. The alcohol was necessary to keep the medicine from freezing in the colder parts of the country. It was also necessary where it was warmer. The formula may not have cured, but it left the patients more relaxed, more tolerant of their aches and pains. Combinations of coca (source of cocaine) and alcohol were guaranteed to make weak people feel strengthened and cheered.

A Phoenix, Arizona, housewife, Mrs. Barnes is a ham radio fan. She writes for numerous journals.

Arizona Bill, "The Great Benefactor of Mankind," arrayed in buckskins like a dime-novel Indian scout, toured Oklahoma with herbal cures and a liniment of peculiar and powerful properties. A drum roll announced his appearance on a stage in front of his wagon. His tale of being stolen by Indians as an infant aroused the curiosity of "the natives." He gained their confidence as he continued with a description of his life with the Indians, and how, before he managed to escape, he learned the secret formula for Rattlesnake Oil from the medicine man. Now he was able to make it available to those in need of its curative powers. The cost was small.

Big Foot Bill's Electric Belt

"I'm Big Foot Bill from over the Hill. I never worked and I never will," sang Big Foot Bill Wallace, purveyor of Electric Belts. Sufferers of constipation, indigestion, gravel, cancer or kidney disease could be greatly relieved, often entirely cured, if they bought the purple satin-covered belt and followed directions. Wallace's electric gimmick was zinc dosed with vinegar. The wearer adjusted the belt so that it came in contact with the skin nearest the ailing area. The resulting tingle was proof to the patient that the belt was doing its job. Big Foot Bill had to keep moving on because the combination of zinc and vinegar usually produced sores around the midriff.

Charlie Tryon offered, for one dollar per four-ounce bottle, Concentrate of Sulphur. Directions: "Three drops in glass of water at bedtime. One teaspoon in bath water three times a week. For plants: spray several times a week." It took Tryon just an hour to manufacture this miraculous medicine. He boiled flowers with sulphur powder and unslaked lime, skimmed off the liquid, poured it into four-ounce bottles, then added labels and directions. The stench alone was enough to promise a cure.

In 1838, with $2,600 to invest, P. T. Barnum went into the medicine-show business with a German named Proler. Traveling in a stylish wagon, they did a fine business with Proler's Genuine Bear Grease, which promised to cover a bald head with beautiful, glossy, curly hair as quickly as any other composition yet discovered.

One can imagine the spiel:

"Ladies and Gentlemen, may I have just a little of your precious time to describe to you the 'extreeordi-

nary' virtues of the elixir contained in this bottle?" Pointing to a bald listener standing near the platform, Proler would continue in his rich voice: "If God meant mankind to go about with his skull naked of hair, why did he bestow upon us this lush and luxuriant foliage that in our natural state starts and stands triumphantly, according to the words of the poet, 'With all its fronds in air.' Yes, ladies and gentlemen, I was in the state of several of you here. For about 20 years my hair had been turning gray. Bald patches were appearing on my scalp and the skin scaled off. I tried all the famous hair restoratives on the market, but they only made things worse. Then I discovered this marvelous hair restorer." Dramatically he would point to his heavy black mane, unshorn and lustrous. "Need I say more, ladies and gentlemen? Within a week a noticeable difference was apparent. My hair began to recover the black luster of my younger days as a boy in the hills of Western Virginia. My head became entirely free of dandruff, and new hair grew where the old had been. You see before you today a man whose pride and hair have been restored together and general health improved."

"How can I—?" would interrupt one poor soul.

"Very simple, my friend. Purchase one bottle of this magical compound for only one dollar and fifty cents and I will personally guarantee that you will have the beginnings of a fine head of hair in a week or two. For the next ten minutes, to everyone who can get up here with a dollar and a half I will make the extra-special-gigantic-double-for-your-money-offer of two bottles."

The Kickapoo Indian Medicine Company was organized in 1881 by John Healy and Texas Charley

Bigelow. For atmosphere they hired 300 redskins, none of them Kickapoos, from Indian agents. Each Indian was paid $30 a month and expenses. They put on a real Wild West Show with rodeo, rope tricks and Indian war dances.

Because of the size of the troupe, the show usually traveled by train instead of medicine show wagons. It wasn't necessary to stage parades. Indians filing down Main Street were spectacle enough. After the Wild West Show, the pitch doctor would lecture in the dignified bedside manner of a physician, a manner that must have carried conviction. For at the end of his lecture, suddenly, with loud war whoops, the Indian chief and several braves went about among the natives, carrying baskets piled high with bottles of marvelous Kickapoo remedies. The most famous was Sagwa. But there were also Kickapoo Indian Oil, Salve, Cough Cure, Pink Pills and Worm Killer: a cure for everything.

Once, on a circuit of Pennsylvania, Healy and Bigelow invited Ned Oliver to join the show. Nevada Ned, who had never been near Nevada, had long hair, wore buckskins and a ten-gallon hat, rode horseback and played the banjo. His savvy of the medicine show business was so great that Healy and Bigelow were content to leave most of the arrangements to him.

In one town the show encountered another show already well established. Undaunted, Nevada Ned organized an enormous parade with himself at the head, dressed in his showiest buckskins and wearing about 50 good paste diamonds. Other riders carried a huge banner that read, "THE GREATEST DISPLAY OF DIAMONDS EVER SEEN IN THE WORLD AT NEVADA NED'S BIG INDIAN VILLAGE TONIGHT." The crowd was eager for the sight of real "jools" and Ned allowed a close-up inspection of several large glittery diamonds. After this initial display, six Indians carried a heavy chest on stage, setting it down slowly and carefully. Nevada Ned approached the chest. The hushed audience waited. Ned raised the lid, and out stepped Black Diamond Tom Harris dressed in a fancy suit made of thousands of red diamonds cut from playing cards. The astonished crowd took the hoax in good humor.

Nevada Ned Oliver specialized in catarrh powders,

knowing that everyone at one time or another suffers from catarrh (an ailment that now goes under the more mundane label of the common cold). His formula included menthol, sugar, milk and cocaine. The finished product was blown into nostrils with a bulb. After months of these demonstrations, Ned became a cocaine addict but, after a hard struggle, recovered. Many of his clients must have become addicted, too.

In the 1890s James Ferdon founded the Quaker Medicine Company. By this time Indian medicine shows had become commonplace, so that the Quaker shows made a hit as a novelty. Ferdon and his "Quakers" invariably dressed in gray or fawn-colored clothes with wide-brimmed low-crowned hats. Their trousers, called barn-door trousers, buttoned up the sides instead of the front. In public these fellows were careful not to use profanity and thee-ed and thou-ed everybody. The sales were many, for who could doubt the honesty of a Quaker?

Ferdon's main product was healing salts that he obtained from mineral springs in the Panamint Range in Death Valley. In 1898 Ferdon's Quaker Medicine Show traveled all the way to the Hawaiian Islands, where he profited mightily.

Dr. Raphael had perhaps the most highly perfected medicine show, with outstanding entertainment and cures for Lost Manhood and Secret Desires of Men. Attracted to his show by a cluster of wiggling dancing girls, the audience saw the good doctor standing under a sign that read "LOST MANHOOD CURED." At an appropriate moment, Dr. Raphael began his pitch for Cordial Invigorant, a specific, he said, that had been used many years with varying success to produce and restore sexual competency. "This Cordial Invigorant stimulates the sluggish animal powers to healthy action, and with vigor comes NATURAL DESIRE.

It brings the system up to the virile point and KEEPS IT THERE."

Even innocent bachelors could hardly miss the point, and many bottles sold for three dollars each, a lot of money in those days.

If the Invigorant didn't sound strong enough for the needs of some, Dr. Raphael's electric belt was sure to answer deeper sexual problems, and, as a bonus, would cure other Peculiar Diseases of Men. A typical belt, with settings from 20 gauge to 80 gauge, came with directions that usually went something like this:

"Set the control at whatever strength your condition requires. For those who are sexually weak, this belt offers new strength when all else has failed. The current forces a vigorous circulation of the blood, enlivening the seminal glands into a healthy glow. Youthful

vigor and natural power return. The full strength of this electric belt absolutely doubles one's sexual force and power."

There were no certificates (testimonials) because the "names of persons applying for this article are considered a sacred trust never to be divulged under any circumstance."

What about poor, weak womankind? Most nostrums benefited both men and women, but it was common policy to avoid dealing with the ladies. Mrs. Violet Blossom, once the very queen of female pitch doctors, said, "Never, never doctor a woman, sick or well. They are much harder to fool than men and the first to kick up a fuss if they figure they've been gypped." Good advice for any age.

Mrs. Blossom organized an Oriental Medicine Show with a dragon-mandarin-firecracker atmosphere. Billed as Lotus Blossom, she claimed to be an English-speaking Chinese of Mandarin lineage. She was intelligent, had an excellent voice and, in dress and manner, appeared to be a very pretty Chinese girl.

Behind the scenes Lotus Blossom manufactured her two favorite and fastest-selling absolute and irresistible cures, Tiger Fat and Vital Sparks.

"TIGER FAT—To Be Used as Needed. Effective for All Ailments of the Flesh," said the label on the little round tin box. To make this ointment Mrs. Blossom melted petroleum jelly in a large bucket, added camphor, menthol crystals, oil of eucalyptus, turpentine and oil of wintergreen. She shaved paraffin into the mixture to make it set, then stirred briskly. While it was still hot she poured it into several dozen small round tin boxes, put on the lids and labels. This salve cost about seven cents to make and sold for one dollar

as a cure for eczema, ringworm, old sores, burns and rheumatism. Vital Sparks was God's Gift to MEN. The use of plural capitals made the medicine's purpose clear. The ingredients were small buckshot candy covered with a thin coating of powdered aloes. Packaged in small boxes and marked $5, Vital Sparks were given free to purchasers of Tiger Fat.

Lotus Blossom sold Tiger Fat with a story about a visiting prince taken on a tiger hunt by his mandarin host. The prince was badly mauled by a tiger and his life was despaired of until an ancient Chinese physician had the tiger skinned and cut up. The pieces were put into a pot and rendered. Anointed with this fat, the injured prince made a wonderful, and remarkably rapid, recovery.

For Vital Sparks her lecture was again an Oriental tale of an ancient Chinese medical secret passed down over the centuries. Lotus Blossom spoke softly, as befitted a lady who must deal in men's medicine. With many pauses and an occasional convincing try for girlish confusion, she told of aged Chinese men, some almost too feeble to walk, who took this same virility medicine. Here Lotus Blossom's voice became even softer, so that her listeners had to strain to catch the words. "Gentlemen, in the space of four hours, those pitiful examples of manhood were flexing their muscles and were crying aloud, 'Pong Wook-ee!', which, as you all know, is the Chinese equivalent of 'Eureka.' "

The many who bought from Lotus Blossom went away with empty pockets but hearts full of hope. If they noticed no appreciable physical improvement, they really didn't mind. It was worth the money to see and hear the enchanting girl in her Oriental finery.

Whether on stage or on the street, all medicine men and their wives dressed wonderfully. The men, as vain as the women, wore full dress suits and carried fancy canes. The women wore expensive tailored suits, elaborate evening dresses, hats decorated with willowy ostrich plumes, sealskin jackets and furs. Their jewelry, diamond bracelets, rings and earrings, were in the latest style, called "sunbursts." All were prized customers in the finest restaurants. They ordered champagne by the case and were big tippers. The men enjoyed imported cigars, although of course no lady smoked (in public).

The big medicine shows prospered well into the 1900s. Then, under the eyes of the awakening medical associations and the new Food and Drug Administration, itinerant quacks could no longer make the wild claims of the past. The picturesque practitioners of medicine show days have gone to their Valhalla. Today we have TV hucksters to warn us of "Tired Blood."

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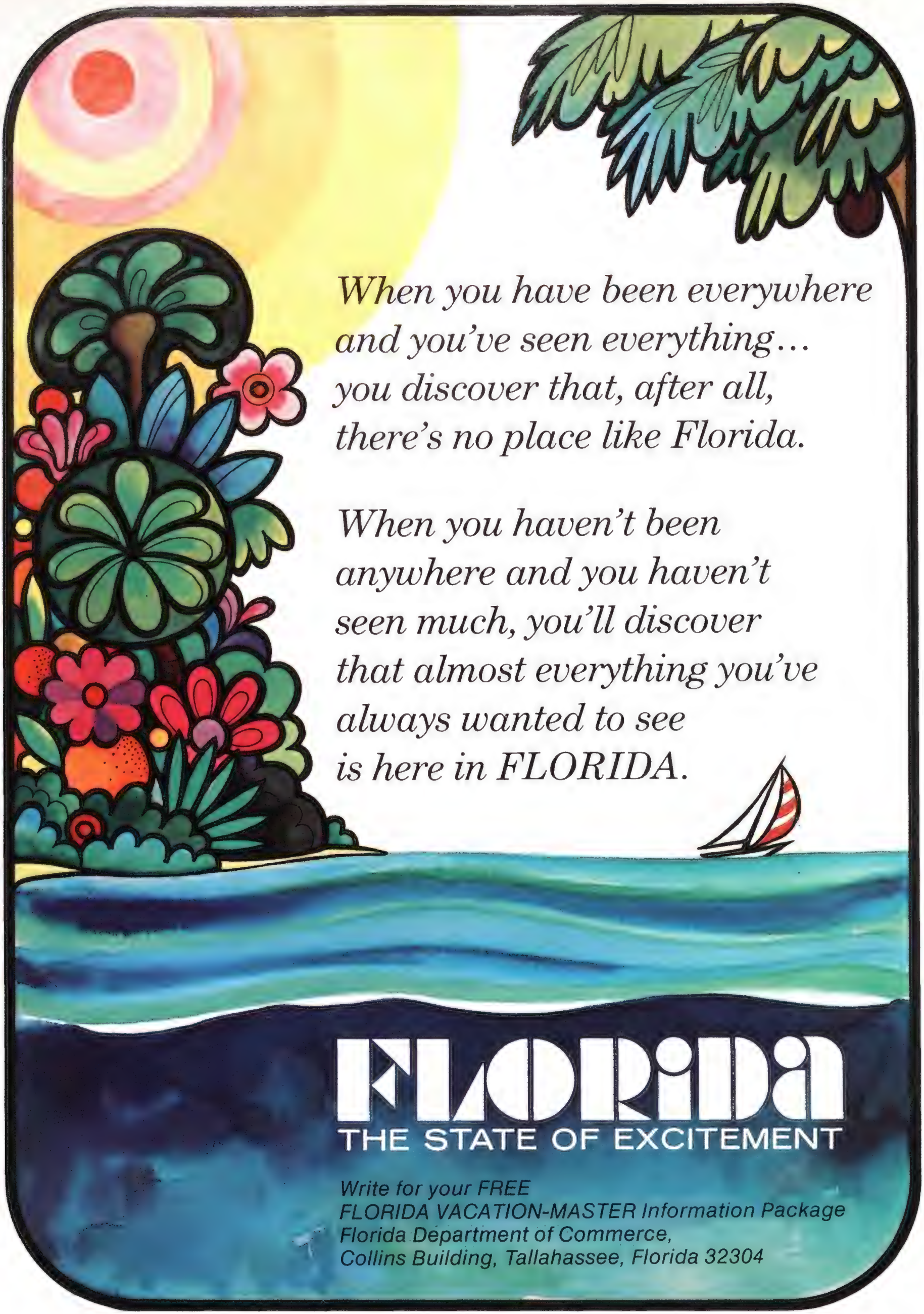
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In the highly mechanized farm system of Salinas Valley in California, these crisp rows of lettuce rely almost entirely on petroleum products from the time they are planted until they reach the table.

By Wilson Clark

U.S. agriculture is growing trouble as well as crops

It takes as much energy to run U.S. tractors as is contained in the food produced. Some experts wonder how long we can keep this up

Until recently, most Americans have taken an adequate supply of food for granted. The great productivity of agriculture in this country is still seen as the best available hope for assuaging the international food crisis. But the American system of agriculture is beginning to show signs of wear.

The key to U.S. food production—and what some also see as its weakest link—is that our farms have become dependent on fossil fuels, rather than on human or animal labor. In a study made for the Office of Civil Defense by the Stanford Research Institute, the dimensions of the energy dependence of agriculture become clear. "We can state immediately," said the authors, "that without petroleum, field crop production is virtually impossible in the United States [agricultural] system."

A basic use of energy on the farm is for powering machines—for planting, spraying, fertilizing and harvesting crops. Economist Michael Perelman of California State University at Chico points out that powering the more than five million tractors in the United States requires eight billion gallons of fuel—the equi-

Photographs by Tex Fuller

valent of the energy content in the food produced. In a very real way, the food products on our tables today are produced as much by dead plants (the fossil fuels) as by living ones. (Recently, several oil companies have begun experimental programs to produce single-cell protein *directly* from fossil fuels, bypassing the fields altogether and linking the human food chain directly to nonrenewable resources.)

The production of fertilizers and farm chemicals such as pesticides and herbicides requires extensive use of fossil fuel energy. Studies made by Barry Commoner and his associates at Washington University in St. Louis indicate that, between 1946 and 1968, nitrogen fertilizer and pesticide use in farming increased 534 percent and 217 percent, respectively. According to Commoner, in 1949 about 11,000 tons of nitrogen fertilizer were required to produce the equivalent crop yield per acre in Illinois that 57,000 tons produced in 1968.

Even though more corn was produced per acre in 1968 than in the 1940s, the efficiency with which crops used available fertilizer actually declined fivefold. Fertilizer's overuse has led to serious environmental problems, such as the addition of nitrates to water supplies. Nonetheless, synthetic fertilizers have made our agricultural productivity legendary.

Since the recent escalation of international petroleum prices, however, the cost of making fertilizer has increased 40 percent, and even at such high prices a fertilizer shortage of 500,000 tons existed here in 1974. The shortage may become even worse.

Modern agriculture has also become dependent on synthetic chemicals—mostly derived from fossil fuels—for pest and weed control. In primitive agriculture, and in diversified farming, pest control consists largely of planting multiple crops which will not be completely destroyed by pest infestations. Such methods are not practical in large-scale, or monoculture, cropping, where one variety of wheat or corn may be planted in fields stretching many square miles. While the use of pesticides and herbicides has contributed greatly to the volume of production by minimizing losses, the environmental effects have been serious and much publicized. Ultimately, the oil crisis may force a return to less energy-intensive methods of pest control, even if environmental precautions don't.

Another high energy user in modern, mechanized agriculture is irrigation. A complex of dams and canals designed to bring water from northern California to the farmlands of the southern part of the state will cost $12 billion when completed—nearly $500 for each man, woman and child in California. The pumping requirements of the water project have been estimated at 13 billion kilowatt-hours of electricity per year. Since the net generation of electricity from the hydroelectric dams will amount to only five billion kilowatt-hours per year, the project will suffer an energy deficit of eight billion kilowatt-hours per year, a substantial part of the state's overall energy bill. Energy-intensive irrigation systems are being installed on a mammoth scale in other areas, including the Pacific Northwest.

All of this intensive use of mechanization and farm chemicals has transformed the substance and the look of the entire food system, as a trip to a mechanized farm graphically illustrates. In the lush Salinas Valley south of San Francisco, agriculture has become a major industry, replete with an army not of people but of field machines which plant seeds, fertilize the soil, apply pesticides and mechanically harvest such crops as lettuce. Whereas ten years ago nitrogen fertilizer application of 300 pounds per acre to a crop would have seemed quite high, it is now common practice in the Salinas Valley to apply more than 1,000 pounds to each of two crops planted on each acre of land per year, or up to 2,500 pounds yearly. Mechanical harvesting enables many crops to be boxed in the field, trucked to a nearby depot, and then shipped—by truck or train—to various points across the United States.

Eric Hirst, of the Federal Energy Administration, found that the food system in 1963 consumed an average of 6.4 units of primary energy (mostly from fossil fuels) to deliver each unit of food energy to the consumer. In some cases, such as with processed fruits and vegetables, more than 15 units of fossil fuel energy were used to deliver each unit of food energy to the consumer. Today the ratio is even greater.

One of the basic ways that the American diet contributes to high energy use is the extensive consump-

Mr. Clark wrote last month's analysis of net energy and the U.S. economy. This article is based on research for an upcoming book on farming and energy.

Crates of lettuce, mechanically picked and crated, roll aboard a train to be shipped to the East Coast.

tion of animal protein, particularly beef. Frances Moore Lappé, in her book, *Diet for a Small Planet,* points out that an acre of cereal can produce five times as much protein as an acre devoted to meat production; legume crops (peas, beans) can produce ten times as much as meat; and leafy vegetables 20 times as much as meat. As food expert Dr. Georg Borgstrom of Michigan State University says: "The livestock of the rich world is in direct competition with the humans of the poor world." Dr. Borgstrom calculates that the difference in food calorie consumption between the rich nations and poor nations is much greater than is generally recognized. In the United States, the average daily calorie (kilocalorie, or large calorie) consumption of an adult is 3,300 food calories, but in India consumption is 1,990 calories. However, since meat consumption is so much lower in India, the grain fed to animals (which are then consumed by humans) represents only 763 additional calories, compared to a whopping 10,017 additional calories of grain fed to animals in the United States. Says Borgstrom: "The difference in calorie intake per capita per day between the United States and India is not, as generally assumed, 1,310, but rather 9,182 calories. This in itself reflects an awesome discrepancy which illuminates a much overlooked aspect of the food-and-people issue."

According to Dr. Herman Koenig, the director of Michigan State University's Ecosystem Design and Management Program, the production of beef cattle in the United States is too mechanized to be really efficient. Some feedlots in America are designed to feed tens of thousands of cattle at a time. The Monfort of Colorado, Inc., feedlots near Greeley process more than 100,000 cattle yearly in a highly automated, computer-controlled operation. Cattle arrive at the lots when they weigh from 700 to 800 pounds, are then fed in pens, and slaughtered five months later when they reach 1,100 to 1,200 pounds. Corn shipped to the Monfort operation from company-owned elevators in the Midwest arrives in yellow torrents. The daily flaking and cooking of corn for Monfort cattle at the company's mills yields more cornflakes than the Kellogg corporation makes each day for human consumers.

Such gargantuan operations are wasteful of energy, according to Koenig, who says that cattle feedlots which have 200 to 300 head of cattle are the optimum size for efficient energy and resource use. On a regional

In modern cattle operations, the computer takes over from the cowboy, directing feed to waiting stock.

Like bison on the plains, cattle stretch as far as the eye can see in the Monfort of Colorado feedlots.

and national scale we may have to think smaller to improve the economy and save energy. "One alternative we should begin to think of is the possibility of limiting the scale of mechanization to provide job opportunities. This carries with it the potential of generating an increased spatial distribution of people and processes to put us in better harmony with the natural environment. It might also relieve some social stresses."

Even the Department of Agriculture, which has done much to promote large-scale farming, has published several technical studies which confirm that small farms can be quite efficient. The department's Economic Research Service says that "the fully mechanized one-man farm, producing the maximum acreage of crops of which the man and his machines are capable, is generally a technically efficient farm. From the standpoint of costs per unit of production, this size farm captures most of the economies associated with size."

Nevertheless, small farms are disappearing daily from the American landscape while corporate farms have become the rule. The Tenneco corporation, for example, which has enormous assets in oil production, chemicals and shipbuilding, has moved into corporate farming in California and other western states under the motto: "Our goal in agriculture is integration from the seedling to the supermarket."

As American agriculture shifts noticeably from small farms using modest amounts of resources to factory farms and distribution systems gobbling limited energy resources, University of Wisconsin researchers John and Carol Steinhart say that "there has been no reduction in [agriculture and food labor] at all—only a change in what workers do. Yesterday's farmer is today's canner, tractor mechanic and fast food carhop." Bruce Hannon, of the University of Illinois Computation Center in Urbana, recently illustrated the energy use entailed in the packaging of food. The McDonald's restaurant chain used the equivalent of 12.7 million tons of coal in 1971 to feed its patrons. For each customer, that was the equivalent of 2.1 pounds of coal. Hannon points out that his objective was not to single out McDonald's for criticism, but to point out the waste inherent in the convenience-food life-style of contemporary America.

As much of the world faces famine today and in years to come, the waste of America's food and agriculture system stands out as a particularly sore thumb of affluence. The choices open to the food-rich nations (Canada, New Zealand, Australia and the United States) are either to export technology or export food.

"None of these [countries] is in a position to give

Each day, more cornflakes flow into the mechanized Monfort feedlots than Kellogg makes for people.

grain away," say the Steinharts, "because each of them needs the foreign trade to avert ruinous balance of payments deficits. Can we then export energy-intensive agricultural methods instead?"

The historic answer to this question lies in the green revolution. Under the scientific direction of agronomists such as Dr. Norman Borlaug, yields of many strains of wheat, corn and rice were improved by the development of hybrids, and improved seeds were distributed widely in poor nations. To get high yields, however, the new seeds often require high rates of fertilization, pesticide use and mechanical irrigation. Thus, the green revolution has a dependency on fossil fuel—a resource in critically short supply, and available only at a high cost.

Dr. David Pimentel, an agriculture specialist at Cornell University, is pessimistic over the future of the green revolution. "Modern, intensive agricultural practices of the western world and those proposed by 'green revolution' agriculture will not offer a solution for the world food problem. . . . To feed a world popu-

The result: tons of refrigerated beef, probably the least efficient way known to provide calories.

lation of 4 billion while employing modern intensive agriculture would require an energy equivalent of 1.2 billion gallons of fuel per day. If petroleum were the only source of fossil energy and if all petroleum reserves were used to feed the world population using intensive agriculture, known petroleum reserves would last a mere 29 years."

Another tragic by-product of the rise of energy-intensive agriculture is the fate of natural seed stocks, which were widely used only a few decades ago. Since the advent of "miracle" hybrid seeds, the older seeds have, in many cases, been lost through neglect—ending a genetic continuity of many millennia. Agricultural researchers are experiencing great difficulty in acquiring stocks of native seeds for preservation programs. According to a recent United Nations report on genetic resources, "the older diverse [crop] varieties . . . are sown no more; many of the wild relatives with which they maintained genetic interchange have been swept away."

The problem of genetic diversity is equally challenging—and frightening—in the advanced nations. The National Academy of Sciences published a major work on the genetic vulnerability of major crops which concluded that such vulnerability stems from genetic uniformity, and that some crops were highly susceptible. In 1970, a blight wiped out 15 percent of the corn, and the situation was corrected only when seed growers developed new seed which was not vulnerable to blight. But seed development is dependent on genetic "banks" which store thousands of varieties of native seed: If the seed is not available, then new varieties can't be developed.

There is a national seed storage facility in Fort Collins, Colorado, but funds are limited and the director of the facility, Dr. Louis Bass, fears that without sufficient funding the seed storage program will not be adequate to meet the challenge of genetic erosion. The consequences of the loss of native seed germplasm are staggering, when one thinks that within one short generation, human beings could throw away key evolutionary links in the food system—all in the name of progress.

The alternatives to continuing the present system, which delivers each calorie of food to the consumer at the expense of 10 to 20 calories of fossil energy, include searching for better ways to use natural fertilizer, instead of depending on synthetic fertilizers. And, in fact, interest in the use of organic materials for fertilization is picking up—not just among home gardeners—but in major cities such as Chicago, which has undertaken a study of the potential use of sewage in conjunction with farming in nearby Illinois and northwestern Indiana.

Other ways to decrease energy use are to encourage the development of smaller, less energy-intensive farms; to use farming methods based on diversity and to plant legumes such as soybeans, which add nitrogen to the soil and minimize the need for nitrogen fertilizers; and to use biological pest-control methods as substitutes for the intensive use of chemicals. In addition, hand spraying of pesticides and herbicides, rather than application by large machines and airplanes, can save energy in large doses. Diversity of this sort could be the starting point for the development of a sound, efficient agricultural system.

Such a system would also make better use of natural energy sources such as solar power. Solar crop-drying techniques are under development in many states, including Indiana, where 60 million gallons of liquid petroleum fuel and 1.5 billion cubic feet of natural gas are now used yearly to dry the corn crop. Windmills can be used to pump water for agricultural irrigation, rather than fossil-powered electrical pumps. Methane gas can be made on the farm from various organic substances, including animal wastes.

To create such an agricultural system, with the concomitant result of better land use and a more widespread population, will not take place overnight, but it will be necessary in the energy- and resource-short years to come. As the English economist Ernst Friedrich Schumacher, has written: "The challenge presented by the energy problem is one of developing a new life-style—a development which logically and inevitably must begin with a change of man's relation to the soil, of which he is a product and which alone sustains his life."

Dr. Louis Bass, charged with U.S. seed storage, fears we may not meet the challenge of genetic erosion.

Marcel Marceau, during a recent visit to New York, leans on an imaginary mantel in his hotel room. His stage and TV appearances gave most Americans their first experience of the ancient art of mime.

By Richard L. Coe

Gathering of mimes stimulates a new interest in their art

Silence is golden — or at least it promises to be for a rapidly expanding group of performers who get along without words

In the beginning was the Word . . .

Words—surely an advance over silence—are man's familial heritage, linking refinements of experience and thought from one generation to another. Yet, in a time of too much communication, words are increasingly tarnished through overuse and misuse. Perhaps that is one reason for America's reawakened interest in the old art of mime—an interest which has shone fitfully since Marcel Marceau first came to these shores in 1955, but which is now growing steadily. The evidence is in the photographs on these pages, most of them taken at the superbly equipped fine arts center of Viterbo College in La Crosse, Wisconsin, which not long ago sponsored an international gathering of mime artists—a festival common enough in Europe but until recently untested in this country.

Above all, mime is silence. Consider how much we can learn without words. A hitchhiker indicates with his thumb, the member which Roman emperors used to signify life or death and which the Philippine Igorots still point upward in victory dances. Stand at a city street corner when the light changes and observe how much can be told about different ages, moods and inclinations merely through movement.

Or consider The Game, the most recent wordless outcropping of charades. Forming a semicircle, you will have defined a space. Let one person begin by imitating, say, someone opening a door, a window, a

Mr. Coe is the drama critic of the Washington Post.

Samuel Avital, born in Morocco but now teaching at the University of Colorado, performs "Black and White," a sketch that emphasizes contrast and —among other things—the "tragic divisions of race."

Photographs by Bill Ray

Antonin Hodek, formerly of Czechoslovakia's Laterna Magika, mimes a frog at Viterbo festival.

box, whatever. Limit A's time to one minute, then let someone else pick up the action. What was beyond the door, out the window, in the box? This is, quite possibly, Man's oldest game, though it began not as a game but as stark necessity. The Game is not art but, refined, it could be.

The most ancient artifacts of the Middle East and Asia take us back beyond written words to bodily and facial expression. Carvings on temples and monuments in India and Egypt, in Iran and Greece, record wordless meanings, martial behavior in battle, dancing grace in worship. Thus, through small expression and grand movement, mime became art.

Aristotle speaks of dancers needing neither poetry nor music, "as by the assistance of measure and cadence only they can imitate human manners, actions and passions." Here, in earliest times, arises a differentiation which haunts mime today.

A mime himself and a writer on the subject, Claude Kipnis observes that "actors and dancers coexist rather pacifically because they have so little in common. Once the mime enters, discord follows. . . . The actor is primarily verbal, the mime is not. . . . One can watch a dance without giving it meaning, or understanding its meaning. . . . The mime fails when he is incomprehensible. . . . The dancer, the actor and the mime share the stage, but each takes a different part of it. Their angles of vision form a common triangle, but at the same time it keeps them separate."

From the Greeks to the Romans

There were tragedies before Aeschylus, but he—as author, actor and manager—heightened all the values. He also introduced dialogue. Building on Aeschylus, Sophocles added a third speaking actor, but that was the maximum number the Greek tragedies ever allowed on stage at the same time. The chief actor spoke the loudest; lesser characters were ordered to speak softly. Could this be a reason why subsidiary characters began to develop marked individuality? Forced by imposed tradition to near inaudibility, and being not only human but also performers, would they then have resorted to accenting mime? It's not an unreasonable supposition when a second clue is considered.

On the Grecian stage such performers originally came from southern Italy and Sicily. Southern Italians and Sicilians, in their performing as well as personal lives, revel in broad gesture and physical speech.

At all events, Roman drama, which developed out of the Greek, held the seeds of Italian commedia dell'arte—including the antecedents, if not the direct prototypes, of such stock commedia characters as Harlequin, Punchinello, and so on. They were frisky, satirical types. Stern elder Romans distrusted the pan-

William Burdick of New York is a specialist in period movement and dance. Here he demonstrates, with the aid of masks and a basic costume, how he transforms himself into a gallery of characters.

tomimists. Tiberius forbade his soldiers and nobles to be seen in their company, Trajan banished them, but Caligula honored them, Marcus Aurelius made them priests of Apollo, and Nero actually became one.

Their effectiveness is reflected in a story about the visit of one Pontus to Nero while a mime was performing the Labors of Hercules. Pontus begged Nero to give him the mime because, he explained, there was a barbarous tribe adjoining his domain whose language no one could learn. The mime, Pontus figured, having expressed his intentions so clearly by gestures, would be able at last to make the barbarians understand him.

As the Romans spread north, the mimes were part of their luggage. Coinciding with the fall of the Roman Empire, the rise of Christianity welcomed the mimes in the form of tableaux vivants illustrating the moral truths to be deduced from the death of Jesus, the Mass itself incorporating symbolic pantomime.

A humble craft, mime remained in the development of mystery plays (from the Bible), miracle plays (about the saints) and moralities (of everyday life). Colley Cibber, the 18th-century English actor, turned historian to discover "mummers, a word signifying one who disguises himself to play the fool without speaking." Women came and went in roles that were otherwise played by men or boys. An earlier writer says that "the old play that Adam and Eve acted in bare action under the figge tree draws most of the gentlemen." But when moralists became restless, Eve's daughters, bare or otherwise, disappeared.

It was "entertainment" in the light, mocking sense and it had been developing several forms in the Italian sunshine. One of them was improvised comedy, without rehearsal, without text—all impromptu. Words describing the scenes and characters were hung in a conspicuous place on the stage (a custom continued today by many mimes) and the ensuing action depended entirely on the mime's skills.

The head of a famous 17th-century Italian mime family, Giovanni Gherardi, wrote of such improvisations: "When an Italian actor dies, it is with infinite difficulty we can supply his place. An Italian actor learns nothing by head; he looks on the subject for a moment before he comes forward on the stage and entirely depends on his imagination for the rest."

In different places this combination of dumb show and improvisation would survive, but in the battle with words over three centuries it was bound to fade. The playwrights' lines took over, though there are scenes that give obeisance to the art such as the "Ages of Man" speech in *As You Like It* and the dumb show in *Hamlet*.

If words were dominating mime in drama, what chance did it have in dance? There were some accommodations. In 1770 the French choreographer Jean Georges Noverre, working with the Italian dancer Gaetano Vestris, insisted that Vestris discard his mask —and the audience, Agnes de Mille tells us, "was astonished by the effect of acting on a movable face." In Denmark, August Bournonville set out to break the stylized, formal bent that mime had taken in dance; an accurate reflection of his early 19th-century un-

Ladislav Fialka, cofounder of the Theatre on the Balustrade in Prague, in "Configuration Mime," a sequence in which he and other members of the group make abstract shapes with their bodies.

limbering can still be seen in performances of the Royal Danish Ballet, which carefully preserves several of his works in its repertory—thus permitting us to experience today what audiences saw more than 100 years ago.

So, by the end of the 19th century, pure mime's side of the Kipnis-imagined triangle—acting, dancing, mime—was the smallest. The words of the drama and the vogue for dazzling ballerinas overshadowed it, and even in the British Christmas pantomimes—the "Cinderellas," "Aladdins" and "Dick Whittingtons"—pure mime took second place to the pointed lyrics of the music halls.

But this century, rocking with revolutionary events and ideas, spun all the performing arts into chaotic invention and cross-national ties. When Fokine and Diaghilev first brought Russian ballet to Paris in 1909, a whole new sense of dance freedom was unleashed.

Mamako Yoneyama of Tokyo combines Zen theory with movement in "The Search for the Bull." In this piece, the "bull" represents unholy desire, which is eventually tamed through meditation and will power.

Fokine ordered: "Man can be and should be expressed from head to foot." Bodies stood out forcefully in the new order.

For mime in dance it was an exciting period. A high point came 20 years later with George Balanchine's ballet, to Prokofiev's music, of *The Prodigal Son*—full of richly mimetic invention. Again history recurs, for this was also the theme of a medieval mystery play.

The potentials for mime in 20th-century dance, however, were as nothing compared with those in a device that its inventor had envisioned as an educational tool, the movies. How could Edison have known that educators and artists would scorn his moving pictures, but that shoe and glove salesmen would see fortunes from the humble in them? As history so often shows, the lowbrow entertainment of one generation becomes cultist art for the next.

As in the Middle Ages, again it was the clowns

Dimitri, the Swiss mime, portrays a redcap who is left with baggage when the train pulls out.

who captivated the public: Chaplin, Keaton, Lloyd, Langdon, Fields, Laurel and Hardy—and Mickey Mouse (cartoons, too, are mime). Still, the greatest mime of the silent screen is often overlooked—not one of the happiness boys, but Lon Chaney. The child of deaf-mute parents, he early mastered mime as a means of communication. His unique genius lay in turning himself into physically repulsive characters who, however afflicted, remained recognizably human.

It seemed when the talkies came along, in the late Twenties, that this would be the end of pure mime on the screen—another repetition of the Aeschylean triumph of words over movement. Yet there were variations to come from France.

With World War II ending, Jean-Louis Barrault had turned from drama to a novelty, Jacques Prévert's ballet-pantomime, *Baptiste*, which had a second major role, Harlequin. To play it, Barrault chose from his company Marcel Marceau. That would lead both actors beyond the mimed *Baptiste* to an epochal film, *Les Enfants du Paradis*, about Jean Gaspard Deburau, the mime of a century before. Both Barrault and Marceau had studied mime with Etienne Decroux, who had received in a direct line through Deburau's successors the training of the story's inspiration. Stimulated, the 28-year-old Marceau wrote in his diary: "*Je veux mime ou rien.*" Mime or nothing; he would give it its widest audience since films began to talk.

Studying further with Decroux, Marceau honed his skill for five years and chose a small theater at the 1951 Berlin Festival for what became a sensation. K. G. Simon wrote of him: "On the tiny stage there moved a single man clad in white with white makeup. Nothing else—he just moved. He said not a word and he did only things of everyday life. He pulled on a rope, took a walk in a storm, climbed a stairway. The sensation was that one actually believed he saw the rope, the wind, the stairway. Of course they were not there. An imagined world became visible."

With no linguistic barriers, Marceau would travel all over the earth in the white trousers, striped shirt and flower-topped hat of his character Bip. It was something new, it had nothing to do with words, and even Ed Sullivan's televiewers were mesmerized.

Marceau also quickened French perceptions about others. They saw what his own countrymen overlooked

Opening the bags, Dimitri finds musical instruments —11 in all—and proceeds to make his own music.

in Jerry Lewis, his mimetic genius. They valued the silent scenes of Red Skelton, whom so many Americans considered an inferior buffoon. Marceau also opened the way for his compatriot, Jacques Tati, who silently pictures, if not often enough, the contemporary urbanite as a universal victim.

It would be hard to overestimate the influence of Marceau during his trailblazing period, for the succeeding generation is giving him the implied compliment of sniffs. They admire him for what he has done, but to them Marceau's careful boundaries mean a backward look, not a forward inspiration.

They don't agree on such single points as music, makeup or costume. More than that, Marceau's successors have read their Freud, Marx and Mao and they search for ways to express psychological, political and religious concepts—concepts born, after all, from words.

At the festival last summer in La Crosse, unlike those in Europe, the visiting artists were to teach the 200 students whose tuition fees, to an extent, made the gathering possible. At first, the professionals didn't cotton to the classes, but ultimately they came to enjoy contact and exchange with the appreciative young. Some of these already had created their own careers in the parks and coffeehouses of San Francisco and New York, much as the visitors had done in their European youth. Among the latter, one is likely to follow Marceau as an American favorite, for agents are hot on his trail. He is Switzerland's Dimitri, a small but well-developed man of incredible lightness who studied with Decroux and performed with Marceau.

There was Tokyo's Mamako Yoneyama. From her studies of Martha Graham and Marceau, she has opened the confines of Kabuki to Western breezes.

There was Noel Parenti of California (cover), who—although a trained dancer—says "I do not dance or mime in traditional fashion. I use my voice, play with objects and an instrument. I do not imitate the activities of life. You might call what I do an exposition of states of being."

There was Ladislav Fialka's Theatre on the Balustrade of Prague. At home, his sizable company collaborates with film and puppets, and although only a small portion of it came to Viterbo, there was enough to show that mime can achieve ensemble effect. Also originally from Czechoslovakia was Antonin Hodek,

who moved to the United States after appearances with the famed Laterna Magika at Montreal's Expo 67.

There was Lotte Goslar (below) who came to America 30 years ago by way of Germany and since then has exhibited her economy of amusedly detached movement in revues, nightclubs and on television.

All these and others had links to mime of the past and a dozen other cultures and tongues. With them one could trace relationships to such as the Kurt Jooss Ballet, whose mimed *The Green Table* was part of the ferment before World War II.

With a range of subject matter extending from such traditions to current philosophies, the boundaries are extended. Purists dispute the use of music; others rely on it. The agreement on makeup and costume is that now anything goes. But governing basics remain: The silent artist must swiftly define both three-dimensional space and time, restricting the first and spending the second. For subject, he must settle on what his audience will recognize as common concern. For movement he has specific areas to command: head, neck, trunk, hips, legs, arms, hands and face. He must know precisely when to freeze from movement into immobility. The physical movements and interior awareness all have their relation to the arts that mime struggles so sinuously to escape—words and mere dance.

Another clue to renewed interest in mime lies in book publishing. Several years ago Citadel reissued R. J. Broadbent's 1901 trailblazer, *A History of Pantomime*, informative but limited. Marceau has written several books. This year Harper & Row published *The Mime Book* by Claude Kipnis, less a history than a functional exploration of techniques, its "flip-book" format presenting more than 800 movement photographs valuable for those not readily exposed to the art. Presently heading the mime section of New York's American Academy for Dramatic Arts, Kipnis performed at a White House state dinner in October and this year will make his first nationwide tour.

For all the interest in mime and its welcome reaction against the treachery of words, one must recall Barrault's considered thoughts, expressed in his autobiographical *The Theatre of Jean-Louis Barrault:*

"It is difficult," he regretted, "to find good subjects, and [it] is still an ill-defined genre. Pantomime is an action which takes place exclusively in the present; it contains neither narrative nor explanation. . . . If one single idea can supply enough material for a ballet, a pantomime which lasts half an hour requires the same amount of material as a five-act play. *Macbeth* could be reduced to a pantomime of forty minutes. . . ."

Thus, since words, mime inherently is self-confined by its own limitations—a minor, elusive art, however universal its humors and exquisite its sensibilities.

Lotte Goslar, long familiar to American audiences, performs (left and center) in her "Greetings."

In "Grandma Always Danced" (opposite), Goslar starts as a child and ends up as an angel (above).

Tina, a young female gibbon in the Hall's Island, Bermuda colony, symbolically walks a tightrope.

By Geza Teleki and Lori Baldwin

Breeding programs aim to keep this a planet of the apes

As wild populations dwindle, primatologists keep searching for the best ways to breed chimpanzees, gibbons, gorillas and orangutans

Apes have played a prominent role in both the evolutionary and legendary histories of mankind. The lives of apes and men intertwined long before 1871, when Charles Darwin outlined their common evolutionary heritage in *The Descent of Man,* but scientific inquiry into the natural habits and habitats of wild apes began only a few decades ago. Not until after World War II did the new scientific discipline, primatology, truly begin to flower. Since then, the study of wild primates has grown exponentially, and field studies of all four apes—chimpanzees, gibbons, gorillas and orangutans—have yielded important discoveries.

Beyond expanding our knowledge of ape biology and behavior, however, field studies have begun to unveil another story: that many populations are being depleted and pressed into marginal habitats at an alarming rate, and may soon disappear from this planet. Thus even while the background props for the evolutionary scenario are being hastily sketched in by primatologists, the stage itself is undergoing extensive erosion by expanding human populations.

Although protection and maintenance of natural primate populations must occur in those nations that still harbor such wildlife, the more prosperous industrial nations share this responsibility because they absorb nearly all the primates traded on international markets. The entertainment and pet trades, the skin industry, habitat destruction and hunting (for pleasure and food) are often identified as major executioners of wild primates, whereas biomedical research is not as often stressed as an important destructive agent. Yet pharmaceutical and biomedical research today provides the largest consumer market for live monkeys and apes. Of some 200,000 nonhuman primates traded annually on international markets, more than 100,000 are purchased solely for experimental use. According to some field primatologists, as many as 400,000 more may die in the process of getting the 100,000 live ones.

Responsibility for enacting and enforcing regulatory measures rests with both proprietary and purchasing nations. Fortunately, some regulations are already in effect. The Endangered Species Act adopted in 1973 by the U.S. Congress will undoubtedly reduce imports of many rare primate species and, as the United States is a major importer of live primates, such legislation will have global repercussions. Corrective actions by exporting nations, on the other hand, are likely to have only a local effect. For example, when India placed severe restrictions on shipping macaque monkeys abroad, the research community, the major customer, merely began to seek other sources. The unprotected macaque population of Celebes is now a prime candidate for exploitation.

When *Conservation of Nonhuman Primates in 1970* was edited by Barbara Harrisson, the United States imported 86,535 primates, some 44 percent of the global total for that year. Research accounted for 69 percent of the primates imported for *all* purposes. Rates for subsequent years are comparable.

Stress on ape populations

The yearly volume of trade in apes is not as high as the trade in most monkeys—fortunately so, for apes are much less numerous in the wild. Apes are also more expensive to obtain and maintain. Nonetheless, they continue to perish at a rate that wild populations cannot for long sustain. Both the Bornean and Sumatran orangutan populations, ostensibly protected by international agreements, remain under stress from poaching and smuggling, activities which persist mainly because markets exist abroad (See SMITHSONIAN, November 1973). A similar situation exists with lowland and mountain gorilla populations.

As it is such a popular subject in physiological, biochemical, immunological, pharmaceutical and other research oriented toward improving human health standards, the chimpanzee now heads the ape-import lists of many industrial nations. Several hundred chimpanzees are shipped out of Africa each year. The Asian gibbon, which is much smaller in size than the other apes, is just now becoming important in experimental research. The plight of the chimpanzee is immediate, that of the gibbon impending.

Clearly there is immense value in promoting re-

search efforts that may uncover solutions to human illness and disease; it would indeed be presumptuous to ask that such research be eliminated simply because apes are vital substitutes for human beings in many experiments. Nonetheless, we would suggest that it is essential to know the full price being paid for these benefits by species other than our own. Benefit can only be measured against cost if both are known.

Many zoological parks and research institutions are trying to breed their nonhuman primates. All such efforts are commendable but, unfortunately, births are all too rare in these captive situations: Few zoos or laboratories manage to produce enough primates to satisfy even their own needs.

Ape births are often highly publicized because apes are exceptionally difficult to breed in captivity. A basic problem may be that captive apes are not really a breeding population at all, but a fragmented collection of individuals, pairs and small groups, of which many do not function as breeders. Rarely do zoos or laboratories have funds or facilities to breed their primates in social units which replicate or at least approximate wild breeding units.

Even those captive groups whose size is in reasonable accord with wild social units do not exhibit a high level of productivity. Consider, for example, the following rates of live chimpanzee births per female per year in two captive and one wild population: 0.37 at the Yerkes Field Station colony in Georgia, 0.30 at the Holloman Air Force colony in New Mexico, and 0.36 at the Gombe National Park of Tanzania. These figures indicate that although captive breeding is much more expensive, the birth rate is no higher, even when the best medical facilities are available. Of course there are outstanding successes. The Cincinnati Zoo has managed to produce eight gorilla infants since 1970. And the Yerkes Regional Primate Center in Atlanta, having specialized in ape reproduction for some 40 years, has logged the births of 173 live chimpanzees. Yet even such exceptional success rarely yields a surplus of infants for sale to other institutions.

One problem is that zoo and laboratory personnel often insist on removing newborn apes from the care of their mothers, arguing that hand-raised apes are more likely to survive. The most progressive institutions still do this routinely. From a purely medical standpoint, this approach may be advantageous and adequate for animals which will spend their lives in a laboratory. But the ape, like man, is dependent upon learning much of its behavior from an older generation, and removal of offspring from mothers inhibits the normal process of socialization. Many human-reared apes will, when reaching adulthood, not even attempt to mate, and many females become inadequate mothers because they have never learned proper infant care. Even among wild chimpanzees the first in-

Young orangutans play at the San Francisco Zoo. They are endangered in Borneo and Sumatra.

fant born to a mother is often lost. Removal of that first infant merely delays the learning process, and sets a pattern of removal to insure offspring survival.

The seven regional primate centers now operating in the United States house some 7,200 primates of 32 species. These centers, together with more than a hundred other breeding programs funded by public and private agencies, produce only three to four percent of the primates needed each year for research purposes. The remaining 96 percent must inevitably be imported. Even with modern medical, nutritional and hygienic techniques available in the captive setting, self-sufficiency remains a dream to be achieved in some distant future. This approach may, as a last resort, help hold the survival line for the ape species which is nearly extinct in the wild, but in the meantime it is an added burden to most wild populations.

Aware of these problems 35 years ago, Ray Carpenter transplanted some 400 rhesus macaques from India to the Island of Cayo Santiago, Puerto Rico. After adapting to this new "semiwild" habitat, where they were fed but could roam freely, the macaque group expanded rapidly. Now surpervised by the Caribbean Primate Center, the colony has produced several branch groups used to colonize other islands, but the original group has been culled to provide monkeys for other research programs.

Attempts to set up free-ranging ape colonies did not begin until the late 1960s. Today there are several in existence, including gibbons on Hall's Island, Bermuda, and chimpanzees on Ossabaw Island, Georgia, and at Lion Country Safari, Florida. Because they are so new, however, the feasibility of maintaining such colonies remains uncertain.

Colony breeding programs could supplement zoo and laboratory programs, and thereby assist in lowering annual ape imports. But we feel that as a first step, short-term projects which focus on breeding individuals under intensive care must be replaced by a willingness to conduct long-term projects which focus on breeding groups. The limitations set by the basic reproductive biology of apes must be acknowledged. (Chimpanzee females begin reproducing only at age 10 to 12, and even those females which live for 45 years may produce less than a dozen infants that reach adulthood.) Colony projects are, in effect, only likely to produce a surplus of apes if they are financed for two or more decades. After all, even the more hardy and prolific macaque colony on Cayo Santiago did not become an exporter for some 20 years.

For previously caged apes whose behavior has been severely damaged by experimental usage, the seminatural colony setting can have considerable therapeutic value. Behavioral and "psychological" sterility, a common disorder among cage-isolated apes which cannot or will not mate, can be mended by an opportunity to lead a more normal social life in a richer outdoor environment. The opportunity for females and males to choose compatible mates favors reproduction.

In addition, the research and exhibition uses of apes can be ideally combined in a colony setting. The *Burgers Dierenpark* in the Netherlands doubles the utility of its chimpanzee colony by conducting scientific observations on the same group that is daily viewed by the public. Much of the factual information is then posted for visitors to read, many of whom follow the life histories of individuals. This double use can cut down the need for importing apes.

Numerous wildlife reserves and parks have been established throughout the world in recent years, but nonhuman primates have benefited only indirectly from this surge of protective activity. There are very few conservation areas in which primates are considered priority mammals. However, since the early 1960s a few parks have been established in Africa and Asia

Mata Hari, the eighth lowland gorilla born at the Cincinnati Zoo since 1970, sits with her mother.

The husband and wife team of Geza Teleki and Lori Baldwin helped to establish the gibbon colony in Bermuda and the Gombe park for apes in Tanzania.

for the specific protection of apes, and plans for additional ones are on the drawing boards.

In Tanzania, the area made famous by the chimpanzee studies of Jane Goodall and her colleagues became the Gombe National Park, established in 1968 as the first ape park in East Africa. Primatologists and wildlife managers are discovering a host of problems special to primate management. The work is pressing, for the few remnant populations in East Africa are in imminent danger of extinction.

During our participation in the Gombe project between 1968 and 1970, we saw some of these problems. We learned, for example, that wild chimpanzees are so highly susceptible to contagious diseases, which run a gamut from common colds to polio, that medical screening and inoculation programs for people had to be devised before the park could open to tourism. The Tanzanian parks service had to design special transportation and viewing facilities that could effectively isolate tourists from chimpanzees.

Another management problem revolved around the grass and bush fires which yearly sweep through large portions of Gombe park. Fires are considered useful in the savanna regions of East African parks because they renew grazing zones for ungulates. But in the mixed vegetation of the Gombe habitat, where primates are the main concern, fires can destroy many plant types essential to their existence. Omnivorous chimpanzees thrive best in an ecologically diverse environment, and the original abundance of plants must be maintained if the 150 chimpanzees in Gombe are to survive for more than a decade or two.

Wild ape management is admittedly a novel task, yet field studies already show that wild chimpanzees can reproduce at rates comparable to those achieved under much more costly captive conditions, and several other wild ape populations may do equally well. If tourism can be locked into these conservation programs, some wilderness areas may even become profitable. Professional application of low-risk culling techniques, together with internationally monitored shipping, would further reduce the crippling rates at which natural populations are being depleted.

As the four ape species in the wild exhibit very different forms of social organization as well as feeding and ranging habits, no single approach will solve problems for all species. Captive, colony and wild programs must be individually tailored to the specific needs and potentials of each ape species.

For all apes, though, the first priority is to determine the numbers and densities of wild populations, and the rates at which these are decreasing and why. We still don't know enough about most ape populations inhabiting Africa and Asia. Until we do know, international trade must be reduced at all levels despite the needs of zoos, laboratories and other consumers. The single possible exception would be for programs that aim to breed apes in social and environmental conditions geared to their specific biological, behavioral and psychological requirements.

We have stressed the need to protect primate populations in terms of their resource and revenue values. When stripped of all economic and academic justifications, however, the heart of the conservation issue is simply a matter of respect for another life form—one which not only serves as a vital substitute for human beings in biomedical experiments, but also uniquely stimulates human emotion and curiosity, and stands alone as our nearest relative in the animal kingdom. Apes really need to be protected, not so they can become surrogates to mankind, but so they can be apes.

Chimpanzees and baboons mix freely in Gombe Park, above, although chimps sometimes eat baboons. An old male, right, shows rarely seen whites of eyes.

By Robert Wallace

The Barbary Wars raged over tribute demands by Arabs

Paying off North African pirates was cheaper than fighting to most naval powers of 1800. But not, finally, to the infant United States

Dey of Algiers receives bags bulging with gold and silver from outraged American official. The Arab rulers scorned American paper money.

To many Americans, the exorbitant price of Arabian oil smacks of extortion. But it's trivial compared to what the Arabs demanded the *last* time they had us over a barrel. The hard truth is that the infant United States, during and after George Washington's Presidency, paid massive tribute to the Arabs again and again. We gave the Dey of Algiers a tribute that amounted to more than one-sixth of the annual budget —equivalent to some $41 billion today. We delivered gold and silver coin right to the docks of the Arabs because they sneered at our paper. "Millions for defence, but not a cent for tribute!" is a traditional American battle cry that rings with stirring defiance. Actually it was only a banquet toast.

At last we ended the problem. We used a method unthinkable today: military force.

Our antagonists were the Arabs of Algiers, Tunis and Tripoli, three of the Barbary States on the Mediterranean coast of Africa. From the 16th century they lived by piracy, capturing ships of Christian countries and enslaving the sailors. The Arabs called their actions war and declared it and ended it at whim. No nation was immune from their attacks. Even England, France and Spain bought peace with annual bribes, and so saved themselves the trouble and expense of accepting the war challenge.

At one time the Barbary pirates held as many as 25,000 Europeans slaves—in a single raid in 1798 they took nearly a thousand captives from an island off Sardinia. Sometimes they cruised the English Channel and North Sea, and once they stormed ashore at a place called Baltimore, Ireland, and made off with some weeping colleens.

Unhappily, Europe was far too divided by commercial rivalries and wars to spare time and money to chastise Barbary. It was more advantageous for a strong nation to pay tribute—in England's case perhaps $280,000 a year, plus personal gifts to the various deys, beys and bashaws—than it was to carry out the normal palliative of the day—to mount a punitive military operation. In the 1780s Thomas Jefferson, outraged at the blackmail, tried to end it by forming a coalition of injured nations, each of whom was to contribute one or two armed vessels to a police squadron. He enlisted such small countries as Portugal, Malta and Denmark (it appeared that the major powers would not interfere with the operation). But a dithering American Congress failed to provide a warship to fill Jefferson's part in this early day NATO task force and it fell through.

At this time Americans had a brisk commerce with Mediterranean ports, and Yankee merchantmen, unarmed, with crews of only 10 or 12, were easy prey. In 1785 Algiers seized the schooner *Maria* of Boston and

Philadelphia blazes in Tripoli in oil painting by Edward Moran. Stephen Decatur escapes after setting fire to the frigate in daring exploit.

All paintings courtesy U.S. Naval Academy, Annapolis

William Bainbridge commanded USS *Philadelphia* when she ran aground and was seized in Tripoli.

the ship *Dauphin* of Philadelphia and held their men for a ransom of about $2,800 apiece. Jefferson and Adams, negotiating for their release, could offer only $200 each. The Algerians merely laughed and the men remained slaves.

A captive seaman from the *Polly*, John Foss of Newburyport, Massachusetts, kept a diary in which he described his countrymen in chains, laboring like Egyptian pyramid builders to improve the harbor of Algiers. In quarries behind the city they cut 20-to-40-ton blocks of stone, dragged them on sledges down to the water and dumped them on a wharf. The Dey of Algiers, who had a villainous turn of phrase, said, "Now I have got you, you Christian dogs. You shall eat stones." Actually the Americans were given black bread and vinegar, and if they rebelled they were beaten with the bastinado, a thin, hard stick applied on the buttocks and soles of the feet, 150 to 500 strokes a session. The bastinado was so painful that men sometimes died under it. However, it was not Arab policy to kill their prisoners because sooner or later someone might pay to get them back.

In 1793 Algiers tightened the screws on the United States, seizing 11 vessels within two months and increasing the number of American slaves to 119. At that, Congress decided to placate Algiers by purchasing a peace treaty and also decided to begin building a navy. Six frigates were authorized, none to carry fewer than 32 guns.

In return for the treaty and the release of captives, Algiers demanded $2,435,000, but settled for $642,500 in cash plus an annual tribute of $21,600 in naval stores. Thus, in the future, American powder and shot, oak planks and pine masts would go into new pirate ships to attack American vessels. Congress knuckled under and approved the treaty. There was a delay, however, in delivering payment—we did not have enough gold on hand and had to borrow it from European moneylenders. Furious, the Dey of Algiers threatened to resume his "war" and had to be appeased by $27,500 worth of jeweled snuffboxes and diamond rings, fine linens and brocade robes offered by an apologetic American emissary. Further, the United States agreed, in the hope of keeping him in good humor, to build a 36-gun frigate for his daughter. The warship *Crescent* was built at Portsmouth, New Hampshire, launched in June 1797, sailed across the Atlantic by an American crew and turned over to the Arabs, together with 26 barrels of silver dollars that had been tucked into her hold as backsheesh.

The cost of the *Crescent*, added to earlier expenses, brought the price of the treaty to about $1 million—at a time when the whole federal budget averaged $5.7 million a year. Similar treaties were made with the

Robert Wallace, author of six books, wrote the article about braving the Grand Canyon in wooden boats in SMITHSONIAN *of May 1974.*

Stephen Decatur, appearing in a miniature, burned *Philadelphia* and salved American pride.

Edward Preble, in a painting by Rembrandt Peale, brought the war right up to Tripoli's dockside.

weaker pirate states of Tunis ($107,000) and Tripoli ($56,486). In both cases we promised to pay tribute and make annual gifts to the bey and the bashaw.

Having purchased peace, the United States sent consuls to the Barbary Coast. Among them was a fiery man named William Eaton, a Revolutionary soldier and Dartmouth graduate. When he arrived in Algiers, en route to his station in Tunis, Eaton and a few other Americans were granted an audience with the Dey, Bobba Mustapha. Eaton described it thus: "Here we took off our shoes, and . . . were shown to a huge, shaggy beast, sitting on his rump, upon a low bench, covered with a cushion of embroidered velvet, with his hind legs gathered up like a tailor, or a bear. On our approach to him, he reached out his fore paw as if to receive something to eat. Our guide exclaimed, 'Kiss the Dey's hand!'

"The animal seemed at that moment to be in a harmless mode; he grinned several times, but made very little noise. Having performed this ceremony, and standing a few moments in silent agony, we had leave to take our shoes and other property, and leave the den, without any other injury than the humility of being obliged, in this involuntary manner, to violate the second commandment of God and offend common decency. Can any man believe that this elevated brute has seven kings of Europe, two republics, and a continent tributary to him, when his whole naval force is not equal to two line-of-battle ships? It is so."

In 1800 the USS *George Washington*, 24 guns, not one of the newly authorized frigates but a converted merchantman, put in to Algiers loaded with tribute for the Dey. The American captain, William Bainbridge, innocently anchored *Washington* under the guns of Bobba Mustapha's fort. That was a sad mistake. Bobba Mustapha commandeered the ship, reasoning that "You pay me tribute, by that you become my slaves." He wished to send a cargo to the Sultan in Constantinople and to him *Washington* seemed a good freighter for the job. Appalled, Bainbridge protested that a U.S. ship could not possibly be pressed into such degrading service. But under the guns he chose to accept the humiliation.

The Arab's cargo for Constantinople included 100

Negro slaves, 150 sheep, 25 horned cattle, four horses, 12 parrots, four lions, four antelopes, four tigers and an undetermined number of ostriches. Thus loaded, trailing exotic fragrances, the USS *George Washington* set sail for the Golden Horn. When Bainbridge got there he found that the Turks had never heard of the United States. He had to explain that he came from the place Christopher Columbus had discovered. Luckily, the Turks had no errands they wanted him to run. After he had unloaded the slaves and the animals he was allowed to take *George Washington*, once again a warship, away in peace.

News of the American disgrace was not well received at home, and when the warmly patriotic William Eaton heard of it in Tunis, he wrote, "Genius of my country! How art thou prostrate! Hast thou not yet one son whose soul revolts, whose nerves convulse, blood vessels burst, and heart indignant swells at thoughts of such debasement? Shade of Washington! Behold thy orphan'd sword hang on a slave—A voluntary slave, and serve a *pirate*!"

Communications between the Mediterranean and North America took weeks. Thus Arabs and Americans took almost simultaneous steps against each other, each without the other's knowledge. The Bashaw of Tripoli, emboldened by the success of Algiers in browbeating America, demanded more tribute. When no new gifts were forthcoming he declared war. According to the custom of the Barbary Coast, he sent a squad of soldiers to the American consulate, where they chopped down the tall flagpole and laid Old Glory in the camel dung. Meanwhile in Washington, however, the newly inaugurated President, Thomas Jefferson, was preparing to send warships eastward to show the flag.

Jefferson wrote the Arabs a polite but steely letter saying, "we mean to rest the safety of our commerce on the resources of our own strength and bravery in every sea." Some recently built vessels had become available and four were dispatched: the frigates *President*, 44 guns, *Philadelphia*, 36, and *Essex*, 32 accompanied by the sloop-of-war *Enterprise*, 12. All were under the command of a fighting captain, Richard Dale, who was not likely to serve as messenger boy for anyone. The squadron sailed on June 2, 1801, less than three weeks after the chopping down of the flagpole, of which Dale knew nothing.

When Dale reached the Mediterranean and found that Tripoli had declared war, he was hampered by his outdated orders. Although Consul Eaton implored him to blast the Arabs, Dale did not think he had authority to do so, and contented himself with a blockade. He remained in the Mediterranean for several months but was unable to bring his frigates into battle. The only sea fight during his mission involved the little *Enterprise* and the cruiser *Tripoli*, which met between Malta and Africa. They were evenly matched, the *Enterprise* with 12 guns and 94 men against the *Tripoli's* 14 guns and 80 men, and they flew at each other instantly. The Tripolitan tactic, like that of all the Barbary pirates, was to try to come alongside and board. The Arabs had a fearsome reputation for hand-to-hand combat. Screaming, brandishing knives, scimitars, pikes, pistols and hatchets, they were accustomed to terrifying their victims even before making their one wild rush.

"Cowardly Americans" lash back

The skipper of the *Enterprise*, Lieutenant Andrew Sterrett, calmly put a broadside into the oncoming pirate ship and danced away. Turning, he hit the *Tripoli* with another broadside and again maneuvered out of reach. For three hours he sailed rings around her and pounded her to splinters, killing or wounding 60 of her men while losing not one of his own. When the *Tripoli* surrendered, Sterrett sent some marines and a surgeon to patch up the survivors and then permitted them to sail their ruined vessel home. The Bashaw, enraged at the pirate captain for his defeat by the cowardly Americans, had him paraded through the city, mounted backward on an ass with the entrails of a sheep draped around his neck, and gave him 500 strokes with the bastinado.

Dale's squadron returned home late in 1801. Early in 1802 President Jefferson prepared to send a second force to deal with the Arabs. Although Tripoli had declared war we chose not to make a reciprocal declaration. Instead, Congress voted an extraordinary resolution authorizing Jefferson to use the Navy as he saw fit. More than 160 years later, when Congress passed the Tonkin Gulf Resolution for President Johnson in

A small boat from USS *Enterprise* nears the flaming hulk of the Barbary raider *Tripoli*.

Lt. Andrew Sterrett's broadsides smashed the pirates while they jockeyed, trying to grapple and board.

the undeclared Vietnam War, the intent was similar.

Although the squadron of 1802 was powerful, including eight frigates, it was commanded by a bumbling, spiritless commodore, Richard Morris of New York, who took more than a year to get his ships in position to bombard Tripoli and then failed to do so. Jefferson fired him. However, Morris' tenure witnessed one favorable event. Consul Eaton, in Tunis, had been driven almost mad with anger and frustration. The Bey demanded more and richer presents, including a ring with an emerald the size of a seagull's egg, and Eaton informed the State Department that he would prefer to be sent to Botany Bay or Siberia rather than endure the humiliation any longer. Fortunately the Bey expelled him as *persona non grata* and Eaton went home with Commodore Morris—but not on the same ship.

In Washington, Eaton laid before Jefferson a scheme that had been developing among Americans in the Mediterranean for a couple of years. The Bashaw of Tripoli was a usurper, having stolen the throne from an older brother who was now wandering forlornly somewhere in Africa. Eaton proposed to find the brother, give him sympathy and support and install him as the rightful head of state. Jefferson approved the idea, and thus was launched the first, although not the last, American effort to overthrow an objectionable foreign ruler and put a cooperative one in his place. Jefferson also chose to have the plot proceed quietly, in twilight. He would send the would-be bashaw, through Eaton, a few artillery pieces and 1,000 small arms. Eaton himself was to be given a vague title—"Navy Agent of the United States for the Barbary Regencies"—and placed under the jurisdiction of the commodore of the Mediterranean squadron. If he could accomplish something, fine; if not, small loss.

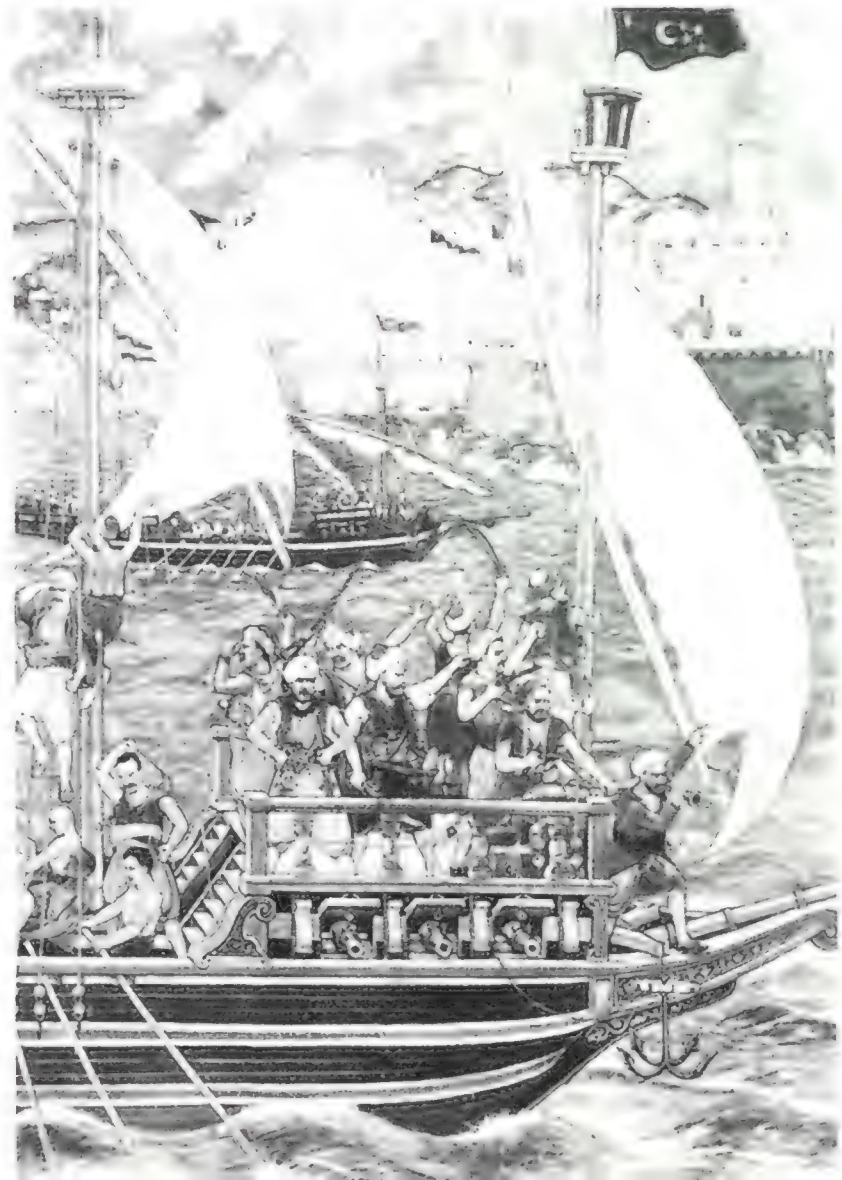
The squadron of 1803 was led by a naval hero of the New England school, Edward Preble of Portland, Maine. Frail looking, slowly dying of tuberculosis, he was an iron-souled man who would shove a cannon into the Bashaw's ear. His fleet included the new frigate *Constitution,* 44 guns, the 36-gun *Philadelphia* and several armed sloops and brigs. Preble's squadron was weaker than its predecessors and sadly, when he had been in the Mediterranean but a short time, the

United States suffered the worst loss of the entire Barbary Wars.

While Preble paused to impress the Arabs in Tangier and Algiers, he sent *Philadelphia* eastward to blockade Tripoli. She was a beautiful ship, built by the citizens of Philadelphia as a gift to the nation, but unfortunately captained by William Bainbridge, the man who had earlier carried the menagerie to Constantinople. While cruising off Tripoli at high noon in a calm sea, Bainbridge ran *Philadelphia* aground. He hit an uncharted gravel shoal known only to local pilots. When he found the ship's hull undamaged he hoisted all sail and tried to force her over the shoal. This failed, so he shifted weight aft and tried to float her off. All heavy guns were rolled as far as possible to the stern, forward water tanks were emptied and the foremast chopped down and heaved over the side; no good. Meanwhile the ship developed a bad list, starboard guns pointing at the sky, port toward the water. And then a swarm of Tripolitan gunboats crammed with boarders sailed out and ranged themselves close by.

There was a good supply of small arms on *Philadelphia* and 307 good men to use them but the weapons were never issued. Bainbridge and his officers concluded that "it was impossible to get the ship off and that all further resistance would be but unnecessarily exposing men in a situation where neither perseverance nor fortitude would be of any benefit to our country or ourselves." After destroying the code book, flooding the magazine, rolling the guns overboard and ordering holes cut in the ship's bottom, Bainbridge hauled down the flag. Not a man had been killed or wounded. The surrender is almost forgotten today. Indeed, when the little American intelligence-gathering ship *Pueblo*, with a crew of only 83, surrendered to the North Koreans in 1968, it was the opinion of most citizens that no American warship had *ever* surrendered to anyone. But *Philadelphia* surrendered—a loss that can only be compared to giving up a 50,000-ton carrier today.

The Tripolitans swarmed over the ship, looting it



"General" William Eaton leads his international "army"—including eight U.S. Marines—across the desert. Arab corsairs, right, swarm to attack.

and stripping officers and men. The Americans were then marched through the city, where thousands of Arabs spat on them, and crammed into a tiny jail. Two days later they could look out into the harbor and see *Philadelphia* floating free. The Arabs had plugged the holes in her hull and got her off the shoal. Moreover, they had fished up her guns and remounted them. The Bashaw had been given a superb fighting ship and 307 slaves into the bargain. He would release them and sign a peace treaty, he said, for only $3 million.

Commodore Preble hurried to Tripoli in *Constitution* and was appalled. Obviously *Philadelphia* had to be destroyed. In an exploit famous in naval history, he sent Lieutenant Stephen Decatur and 62 men in a small vessel at night into the harbor, where they overpowered *Philadelphia*'s guards and set fires that consumed her. The Bashaw complained that Decatur's men had heartlessly cutlassed the guards and thrown them into the water. "People who handle dangerous weapons in War," Preble replied dryly, "must expect wounds and Death." He then prepared to bombard the city.

The Bashaw then let it be known that he would consider a payment of $500,000 instead of $3 million, but Preble was not interested in purchasing peace or paying tribute. "I had rather spend my life in the Mediterranean than consent to either," he said.

Brawny American tar rescues Stephen Decatur from knife-wielding pirate in hand-to-hand fighting.

Testing the Arabs' myth

Tripoli was formidably defended by thick walls and forts mounting 150 cannon. In addition, the Bashaw had 19 gunboats and a half-dozen other armed ships in the harbor, bringing the total of his guns to about 200. Preble had 156, of which 44 were on *Constitution* and the rest on smaller vessels ranging down to a few single-piece gunboats he had borrowed from the Kingdom of the Two Sicilies, which was also at war with Tripoli. Approaching the harbor, he sent these small craft ahead of him to engage the enemy at close range. Here, finally, the frightening reputation of the Arabs in physical combat was to be tested. European victims of the pirates had not seriously tried it.

Stephen Decatur in the leading gunboat threw grappling irons into the largest Tripolitan craft and leaped aboard, followed by several grim Yankees carrying the usual close-combat weapons plus axes and steel tomahawks. It was dreadful. The Arabs, superior in numbers by 36 to 20, were speedily carved up—16 killed, 15 wounded, five captured, against Decatur's loss of three wounded. In similar actions nearby, two more enemy gunboats were taken with many pirate casualties, few American. Meanwhile Preble brought *Constitution* within 600 yards of the forts, and fired broadside after broadside. Ramparts and rooftops of the city, crowded with Tripolitans who had come out to watch the American defeat, were suddenly swept clear. The Bashaw and his aides scurried into a bomb-proof shelter beneath the palace. For two-and-a-half hours Preble pounded Tripoli and then slowly withdrew to regroup and refit.

Four days later Preble sailed back into the harbor, guns thundering. *Constitution* alone fired 500 solid shot and 48 explosive shells, many of them into the palace. Two-and-a-half weeks later Preble returned and terrified Tripoli with a night bombardment from 2 A.M. to dawn. In three days he did it again, and yet again a week after that. The Bashaw's cannoneers fired back but scored few hits. Preble brought his ships so close to the forts that they overshot him, and in any case the Arabs proved to be, as he reported, "wretched gunners."

The Bashaw now decided that he could release the prisoners for a bargain price of only $150,000. Preble, who would never voluntarily have given him a penny, was obliged to follow orders from Washington and countered with an offer of $120,000. The Bashaw refused—and there for a time the matter came to rest, with the fleet blockading the city and *Philadelphia*'s crew, greatly cheered, watching from their prison, a flea-infested old warehouse which measured only 25 by 50 feet.

Most Americans endured captivity stoically but five of them—as a few other Americans were to do many years later in Vietnam—sided with the enemy. In return for favors they "turned Turk," toadying to the

jailers and informing on their shipmates. The leader of the turncoats was *Philadelphia*'s quartermaster, who became so obnoxious that a marine sergeant publicly beat him up. The marine was bastinadoed for this, 500 strokes, but lived through it.

While the war at sea simmered down, a remarkable campaign began on land. Former Consul William Eaton, searching for the Bashaw's deposed brother, found him in a small town deep in Egypt and offered him help in regaining his throne. The man was agreeable, particularly when he saw that Eaton had money. In Cairo, Eaton enlisted the oddest crew ever to fight under the American flag and started to walk 1,000 miles to Tripoli. There were 300 Arabs, including the would-be Bashaw, an English soldier of fortune named Farquhar, 107 camels, 38 Greek mercenaries, various officers of shady pedigree including Captain Luco Ulovic, Captain Vincenzio and Colonel Leitensdorfer (or possibly Santuari), who had been a Capuchin monk and a coffee-shop proprietor, Aletti the manservant, 25 artillerymen from almost as many nations, one brass cannon and a few asses to pull it. There were also eight U.S. Marines commanded by Lieutenant Presley Neville O'Bannon.

Eaton, O'Bannon and the marines were the little army's heart and soul. The Bashaw's brother, a timid man, was of small help. Cursing, threatening the Arabs with their swords, Eaton and O'Bannon somehow bullied their strange battalion west from Cairo along the North African coast. They marched through deserts with the fierce *khamsin* blowing sand in their faces. They staggered in the sun by day and came near freezing at night. The Arabs kept demanding more money, stealing camels and deserting.

"We were frequently 24 hours without water," wrote one of Eaton's men, "and once 47 hours without a drop. Our horses were sometimes three days without, and for the last 20 days had nothing to eat except what they picked out of the sand. The country was a melancholy desert throughout, and for the space of 450 miles we saw neither house nor tree, nor hardly anything green, except in one place, not a trace of a human being."

Eaton marched past places that were to become famous in World War II—El Alamein, Sidi Barrani, Tobruk—and after 500 miles he came to the walled coastal city of Derna. The Bashaw's capital of Tripoli was still another 500 miles farther west, but Derna belonged to him and was his second-ranking city. Offshore at Derna were three small ships of the U.S. Navy, mounting 38 guns altogether. While the ships bombarded the city, Eaton made ready to attack by land. The walls were strong, loopholed for guns, and defended by several hundred Arabs. But Eaton adjusted his epaulets (he had appointed himself general) and ordered a charge. For a few minutes the battle was in doubt but after the Arabs got a good look at Eaton and eight marines coming at them with fixed bayonets, they broke and ran. Eaton was shot through the wrist; one marine was killed and two wounded. The campaign is commemorated in the second line of *The Marines' Hymn,* "To the shores of Tripoli," and the dress sword of Marine Corps officers has, to this day, a curved Arabian hilt as a nod to Lieutenant Presley Neville O'Bannon.

With the capture of Derna on April 27, 1805, the Bashaw of Tripoli found himself seriously threatened.

U.S. Navy goes into action in Battle of Tripoli. Led by *Constitution*, right center, Preble's squadron pounds lateen-rigged corsairs huddled in harbor.

There was an army on his flank and a menacing fleet off his shores. He could easily, or so Eaton and the naval officers thought, have been forced to liberate *Philadelphia*'s crew with no payment. But timid diplomacy threw away the advantage that American arms had won. An American consul negotiated, and the Senate ratified, a treaty whereby Derna was returned to the Bashaw and his unfortunate brother was sent back into exile. The prisoners were indeed liberated, but only after the payment of a ransom of $60,000. Eaton returned to the United States, where he was briefly hailed as a national hero, but he was unable to forget what the diplomats had done. He got drunk and stayed drunk, and died six years later.

We gave no more money to Tripoli, but went on paying tribute to Algiers. Despite this, the Algerians continued to seize American ships, among them, in 1807, the schooner *Mary Anne* out of Boston, commanded by a flinty man named Ichabod Sheffield. After the Arabs had taken the vessel they imprisoned the Americans in the hold and put aboard a prize crew of eight men. Ichabod Sheffield got loose a few days later and he and his men rushed the Arabs, killed four of them, put the remaining four in an open boat and pointed out the way to North Africa. Apparently the Arabs failed to get home, for in 1808 the Dey of Algiers presented the United States with a bill for $18,000 to recompense him for the lives of his eight subjects. It is reasonable to think that the United States pointed out to him the way to Hell, but that is not what happened. We paid the bill.

In 1815 President Madison concluded that we had had enough. Madison sent over a fleet commanded by Stephen Decatur, by then a commodore, who cowed the Arabs and ended the tribute forever.

Or so he thought then.

Extinct in the wild by 1806, the lost Franklinia may become the symbol for endangered U.S. plants.

By Dale W. Jenkins and Edward S. Ayensu

One-tenth of our plant species may not survive

The first national census of threatened plants in the United States lists some 2,000. For many reasons, all of us stand to be the losers

The lost Franklinia shown above is the first native species of flowering plant of North America known to have become extinct in the wild. This splendid tree was discovered in 1765 on two acres near the Altamaha River in Georgia. It is named *Franklinia alatamaha* in honor of Benjamin Franklin. It was exterminated in the wild by 1806 and survives in cultivation only because of the beauty and fragrance of its flowers, for which it was apparently greedily collected. Specimens were taken to England's Kew Gardens and a few were cultivated in gardens in the United States. Three of them now grow in front of the National Museum of Natural History in Washington.

How many species of plants have become extinct in the United States since the arrival of the first settlers? More to the point, how many more are endangered or marked for extinction?

A proposed list of endangered, threatened and re-

cently—or apparently—extinct species of higher plants native to the United States has just been drawn up. It will be published by the Smithsonian Institution in response to the Endangered Species Act of 1973. This act called upon the Secretary of the Institution to review species of plants which are now or may become endangered, to present methods for preserving such species, and to report the results—with recommendations—to Congress in one year.

Of the approximately 20,000 species, subspecies and varieties of native higher plants of the continental United States, at least ten percent warrant concern. About 100 species are recently (within 200 years) extinct or presumed extinct, about 750 endangered, and more than 1,200 threatened. These species are either very rare, with local or limited distributions, are subject to threats, or are heavily depleted by destruction of habitats or by commercial or private collectors.

Hawaii is a special case. Its flora are among the most vulnerable and heavily damaged in the world. Of Hawaii's approximately 2,200 kinds of higher plants, the Smithsonian report lists about 50 percent of them as endangered or recently extinct.

Endangered species are those currently in danger of extinction throughout all or a significant portion of their range; *threatened* species are those likely to become endangered within the foreseeable future throughout all or a significant portion of their range; and *recently* or *possibly extinct* species of plants are those which can no longer be found after repeated search in the locality where they were originally observed, or in other likely places. Some species may be extinct in the wild but preserved in cultivation, as is the lost Franklinia.

The Smithsonian lists include the higher plants: angiosperms (flowering plants), gymnosperms (pines and relatives) and pteridophytes (ferns). Lower plant groups will be included later. Only species native or indigenous to the United States (including Alaska and Hawaii) were listed. If a rare species also occurred outside the United States, it was not listed unless its exact status was known. No introduced species were included. Species and well-recognized subspecies and varieties were included, but color forms, known hybrids and horticultural variations were excluded.

Even with all these restrictions and omissions, the number of endangered plants is alarmingly high. Unfortunately, plants are not only taken for granted, but are destroyed without concern. Most of us know that plants are essential to our survival, that we are dependent on their fixing solar energy as carbohy-

Dale Jenkins is consultant on the Endangered Plant Project; Edward Ayensu is chairman of the botany department, National Museum of Natural History.

Amoreuxia wrightii, too rare to have a common name, is endangered by collectors in its native Texas.

Hawaii's *Rollandia angustifolia* is pollinated by birds with bills curved to match its flowers.

Calochortus obispoensis is a threatened mariposa lily found only in Obispo County, California.

Epithalantha is a button cactus genus threatened by collectors and commercial exploitation in Texas.

The Tennessee coneflower, *Echinacea tennesseensis*, grows on cedar barrens, is threatened by construction.

drates in supplying our food, fiber, shelter and fuel. But we often fail to appreciate that the widest possible variety of plants is crucial to our future well-being for many other reasons.

Esthetic appreciation and love of beauty for its own sake are important reasons for preserving rare plants. Natural areas and flowers in our homes make our environment more livable and beautiful. But some of the most prized plants are also the most rare, and many rare species are too beautiful for their own good, especially orchids, cacti, lilies, heaths and primroses. Some medicinal plants such as ginseng and goldenseal have been seriously depleted by over-collecting. Unique or bizarre plants such as the carnivorous Venus's-flytrap and pitcher plants are commercially exploited.

Every species or variety of plant has a unique type of germ plasm, or gene pool, with its own genetically coded characteristics and values. When a plant species is extinguished, the gene pool cannot be duplicated or reestablished and is lost forever. Each kind that we destroy narrows our options. Imagine the loss to mankind if we had destroyed the cinchona before discovering quinine's antimalarial qualities. It is estimated that 50,000 new chemical compounds can be discovered in plants, including some with important medical uses. Plants produce biologically active chemicals, including safe insecticides, and provide us with the chemical structures to synthesize others.

Food production has become a major world problem. The species of food plants now being grown and marketed are the results of long years of selection. Each species represents a unique genotype, and to lose some of the genetic variability could be disastrous. We need to conserve the progenitors of our present food crops (see p. 59) for use in hybridizing and crossbreeding, preserving original values, and developing disease- and pest-resistant strains. Some of the ancestors of corn, for example, are very rare; some are apparently extinct.

If we are to use presently uncultivated lands to supplement the world's food supply, or adapt crops to changing climates, new types and varieties of plants will have to be developed. We do not know which rare species may have value for food production.

The numerous habitats and ecosystems of the world require a wide diversity of plant species. This diversity is essential to maintain ecological stability and to prevent wind and water erosion, develop soil and retain water. Many of our rare and threatened species are especially valuable since they are able to grow in difficult habitats, such as cedar and shale barrens, islands, sand dunes, ocean and estuary shorelines, rock faces, mountaintops, bogs and other unstable areas. They should not be lost.

Throughout the course of the evolution of life on

Prunus havardii, the Havard plum, has potential for agriculture but is threatened in Texas.

Earth, some species have disappeared, while others have adapted or developed into new forms. Those destroyed by the rising and sinking of the Earth's crust, flooding and severe climatic changes have been slowly replaced by new species adapted to the new environment. But enter Man, with his technology, growing population and general ignorance, and the natural tempo is speeded up like a time-lapse film of a sunset. There is no time for adaptation or replacement.

Habitat destruction is only one problem. Overgrazing by domestic animals, use of fertilizers and herbicides, introduction of foreign plants without their natural controls, and destruction of insect, bird and bat pollinators all can endanger plants. Locally introduced foreign diseases, insects, birds or other organisms may spread over the entire continent.

Plant populations are directly destroyed by the collection of entire plants, their seeds, fruits or flowers. Collectors of rarities persist in causing serious damage to critical species, despite the high frequency of unsuccessful transplants.

Now that we know how many species of plants are in trouble, what can we do to save them? Most important is preservation of their habitats. It is also important to control commercial exploitation. The public must be alerted to the damage done by transplanting rarities and picking their flowers. We need to study certain species to determine their requirements and to monitor their populations. Some, for example, may require periodic fire.

A promising approach to habitat preservation is mapping of all species to determine aggregations or centers of endangered ones.

In the United States there are several areas with concentrations of species known only in those regions. The major centers are in Florida, the southern Appalachian Mountains, Texas and California. Locating endemic centers and aggregations of species enables us to set priorities for preserving their habitats. Land acquisition by federal, state and local government and by private groups, designation of natural landmarks and conservation easements are all ways to do it. Endangered plants should be given a high priority in evaluating environmental impact statements.

Commercial exploitation must be controlled. Nearly a third of the native cacti are on the endangered, threatened or extinct list. Yet cacti are commercially collected by the truckload, with most pressure on the rarest species which command the highest prices. Some species of cactus and other succulents are so rare that they could be made extinct in minutes. Commercial suppliers should be subject to stiff penalties for collecting threatened species from the wild. Rather, they should be encouraged to grow them directly from seed.

The craze for rarities should be discouraged. The owner of an extremely rare and endangered plant dug from the wild should be made to feel the same social disapproval that owners of leopard coats now receive.

Digging rare plants to transfer them to a garden, even a professionally run botanic garden, is not the answer. Breaking the roots of some species causes infection and death. Many rare plants have highly specialized requirements which are frequently unknown. Even if transplanting is successful, the future, especially the reproductive future, of the plant is uncertain. Plant collections are often lost with the death of the owner. Even the best botanic gardens' rare species are exposed to hybridizing with related species, and records may be lost over long periods of time. Artificial cultivation should be considered only as a last resort if an unavoidable threat endangers the species, and only with the ultimate objective of reestablishment in its original or a similar habitat.

It is incumbent on Man, as the dominant species, and the only species which has some control over not only its own future but the future of life around it, to interact wisely with his natural environment. The irony of the present situation is that Man, for the most part, is destroying those species which can give the best insight into evolutionary development. There are several thousand species which have adapted to unusual environmental conditions. What genetic quirks have they developed that nothing else has? With the answers to that question, Man might repair some of the damage already done, and be more effective in assuring future ecological stability.

Collectors and grazing have endangered the silver sword, *Argyroxiphium kauense,* in Hawaii.

IBM Reports

The computer and productivity

At a time in which many economic axioms are being severely tested, one stands firm. Today more than ever, productivity is recognized as a basic measure of economic progress.

In the long term, raising the standard of living of all the world's people will require major breakthroughs in productivity. In the short term, the erosion of inflation makes substantial increases in productivity necessary to help maintain the standards that have already been achieved.

These needed increases in productivity will come not only from working harder, but from working "smarter". Only through improved management of our resources—human, natural and financial—will we be able to maintain and improve our quality of life.

Of all the "engines" that have been developed to help us with our work, few possess the computer's potential for contributing to productivity.

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For us at IBM, the challenge of productivity is plain. It lies in continuing to help increase the productivity of the computer. The rest will follow.

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Thomas Gilcrease Institute, Pony Express Museum, Harper's Weekly, 1866

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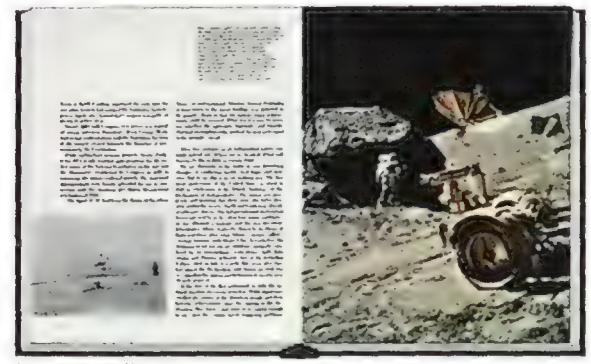

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As 1976 draws near, many American families are beginning to realize that their pride in America's past is not equalled by their real knowledge of it.

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Book reviews

The Days of Augusta
Edited by Jean E. Speare
Photography by Robert Keziere
(David & Charles, $6.95)

The scale of little things has nothing to do with the dimensions of effect; consider the atom or the lamentations of Jeremiah as examples. This little book of 80 pages—23 of which are superb photographs—achieves the stature of a contemporary classic of oral literature. In the words of Mary Augusta Tappage who is 87, as edited with great sensitivity by Jean E. Speare, a kind of life is evoked in all of its outer experience and inner form. A small epic of human dimension is presented.

She was born at Soda Creek in the Cariboo country of British Columbia in February 1888. Her paternal grandfather was partly French. Her maternal grandfather was chief of the Soda Creek Indians, a Shuswap tribe. When she was four she was sent to school at St. Joseph's Mission, a Roman Catholic enclave in the Onward Valley near Williams Lake. "What I could never understand," she says, "we weren't allowed to speak our language. If we were heard speaking Shuswap, we were punished. We were made to write on the board one hundred times, 'I will not speak Indian any more.' And now we are supposed to remember our language and our skills because they are almost lost. Well, they are going to be hard to get back because the new generations are not that interested."

When she was 15 she married George Evans, son of a Welshman and a Shuswap woman. They settled on the banks of Deep Creek, not far from where Augusta

(Actual photo of property)

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was born. She never left the locality.

"We had three years to pay off the farm and we did—but it was hard work. One way we were lucky. In those days you could work off your taxes by doing work on the road, so that's what George did."

A son was born, then a daughter who died at birth, another son, another daughter, also lost at birth.

All this is told in a short preface.

The remainder of the book is in Augusta's words: tales, experiences, the death of her son, a hanging, how to make a basket, catching a sturgeon, memories of childhood.

At the mission you polished your right shoe and put it on a bench, for holding candies and a present. "And then we all went to chapel through the snow. That first Christmas for midnight mass."

On the deaths of her daughters (Jean Speare has presented these words in three-line stanzas, as poetry, which they are): "They say a child born at six months will live,/But not at eight!/ That's what they claim, and so they died./No doctor, no help. If your child was sick/it had to die./That's the way it was in those days."

"Doctor's Book: I bought a doctor's book from Eatons./It was down at Regina then./It cost me three dollars, yes./ But I read that book from end to end./ I learned it by heart./At night in my kitchen by candlelight./It was this thick and it had pictures./About everything—mother, baby, boils, breaks,/Yes, I learned it by heart./I said, 'I'm not scared to help them.'/No doctors, nobody; so I learned that book/And I helped them."

She helped at births. "You've got to be awfully quick. There's two lives there."

There is the story of catching a nine-foot sturgeon that the Hemingway of *The Old Man and the Sea* might have admired. ". . . Finally it came toward the shore, little by little—getting tired, I guess. And I guess this hook was hurting too. It must have. Yes, it must have hurt."

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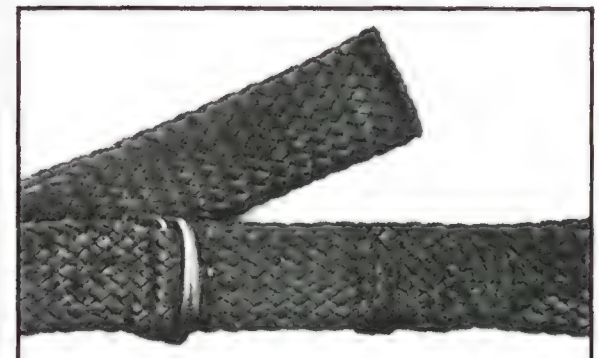

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way; "You cut it toward the sun this way."

She reflects on marriage today and says: "You were married and your husband kept you/Until he died. And you—/You stayed with him until he died/And that was that."

This book is so pure and the language so direct and simple that it is clumsy, if not embarrassing, to encumber it with words like "classic," "heroic," "epic." That is why it is in small ways, authentically, each of these.

—Bennett Schiff
Associate Editor, SMITHSONIAN

The Scientific Breakthrough: The Impact of Modern Invention
Ronald W. Clark
(Putnam, $14.95)

The versatile systems of modern technology have transformed our world and made it hard to imagine it as once it was. I wonder if the Smithsonian's new National Air and Space Museum rising on the Mall in Washington will be able to give its visitors any sense of the earthbound wistfulness with which men envied the flight of birds before the Kitty Hawk "Flyer"—to be displayed there—held itself aloft above a wintry beach in 1903. The faculty of invention itself takes flight, one might say, from our ability to imagine things as being different from the way they are. And we can join in the exercise of the same power by imagining things as once they were.

The history of invention does not offer suspense or surprise, for most students of the subject will know how events actually turned out and what was found to succeed. The aim of such history is instead to enlist our imaginations in how gaps in human ability came to be felt and how people bent their efforts to bridging them. It carries our imaginations backward in time over those same gaps, and so allows us to re-experience adventures of mind. If we failed to do so, the major inventions of the modern world would be mere magic and have far less to do with human imagination.

One of the great virtues of English biographer (Einstein and J. B. S. Haldane, among others) Ronald Clark's new text and pictorial history of invention is that he so strongly encourages and aids our imaginations in reentering the world as it was before any of the modern miracles of technology he describes had yet

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One who is helping her survive

Crispina Aguilar's case is typical.

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been contrived. If the book is read attentively, it allows one to strip away today's understanding of its subjects and reinvent them in reverse. As an illustrated history the book justifies its price, for it reproduces engravings and photographs of machines performing before their first audiences, allowing us to re-experience the novelty and surprise of those moments.

Clark holds us free from unnecessary detail in order to draw together what might be styled family histories centered upon themes of invention: photography, flight, energy, materials and human fertility. He leads us along paths of discovery from problems to their successors, which helps us to realize that technology is the product of whole chains and networks of thought.

His story centers on British experience. This is no weakness in the account, for it serves to bring home to the American reader the international character of invention in the modern world. Each sequence is drawn to show what discoverers were seeking as they made their way from one stage of knowledge to the next. The result is a readable, rewarding account of the growth of knowledge which has endowed humankind with new, and sometimes fateful, powers. It prompts one to hope that those seeking remedies for our social ills will be able to pursue avenues of discovery toward equal breakthroughs. Such a thought does not seem unduly optimistic after retracing, with Ronald Clark, the routes by which we have arrived at our present position.

Philip C. Ritterbush
—Editor, *Prometheus*, whose latest issue deals with technology and human values

Gathering of Animals,
An Unconventional History of the
New York Zoological Society
William Bridges
(Harper & Row, $12.50)
Zoo Animals, People, Places
Bernard Livingston
(Arbor House, $8.95)

You are not going to get a cross word out of me about either of these books. Neither is perfect (how many books are?) but each is perfectly acceptable; each, in its own way, delightful.

Bernard Livingston, in *Zoo Animals, People, Places,* takes the wide-angle approach and the long historical view (Noah was the first zoo keeper) but con-

centrates finally on zoos in the United States, their present condition and their future hopes.

A lawyer, a former UPI photographer and an enthusiastic zoo buff, Livingston knows how to research a story, knows how to interview zoo keepers (an amiably talkative bunch, anyway) and, most particularly, knows how to illustrate his general themes with specific instances, from Washington's pandas to the wonders of San Diego's breeding program.

He also knows how to dig out and present both sides of a controversial subject, such as the commercial drive-through, or "safari" zoos which now seem to be springing up, under the most peculiar financial auspices, on every side.

Livingston deals very nicely with the Bronx Zoo both in its long devotion to some of the causes that have so recently become fashionable and in its intriguing plans for the future.

But no one can do full justice to the New York Zoological Society, creator of the Bronx Zoo, in a single chapter. That requires a book of its own. Fortunately, we have one—and a good one—in William Bridges' *Gathering of Animals.*

Bridges is Curator of Publications Emeritus of the Society, and the compiling of his "unconventional history" has taken him into some dusty files indeed, but he has emerged with a bright book that is highly readable. It is studded throughout with well-rounded portraits of the remarkable men who created the Bronx Zoo, and along the way managed a few other accomplishments: virtually saving the American bison from extinction, likewise the giant redwoods, creating a first-class aquarium, contributing immensely to zoo keeping as both art and science. While delighting the millions who visit their park, they have also thrilled millions more with their written accounts of their activities afield.

With a collection of individualistic characters like that, the reader is quickly aware that all the snarls and snorts out in the Bronx were not in the cages, nor all the clever tricks in the monkey house.

It is to Bridges' credit that, while he venerates such men, he is able to see them warts and all, and so invites us to do the same. The story is in the people as much as in the animals, and a rousing good yarn it is.

The Livingston book is a well-researched general account of where zoos

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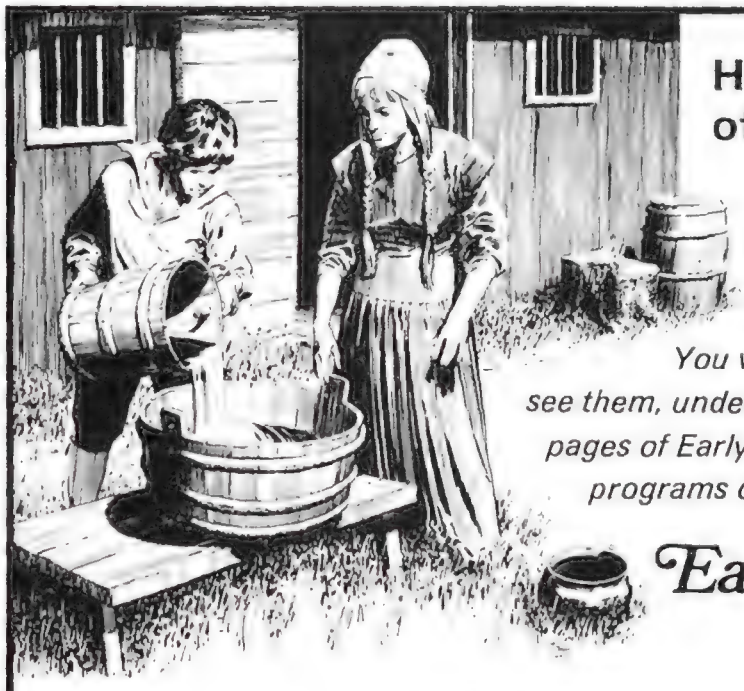

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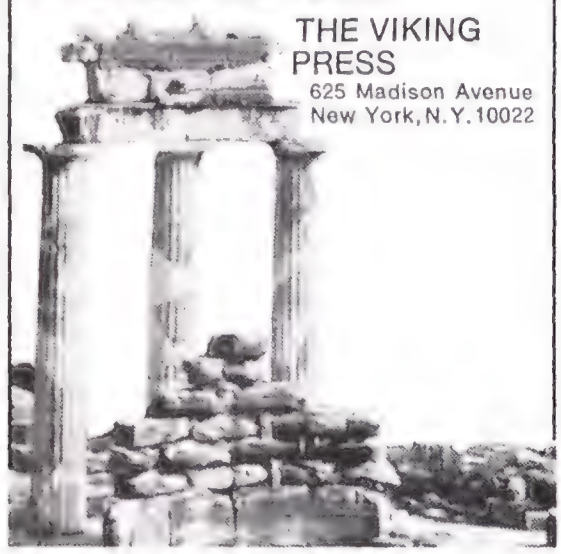

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stand today. The Bridges volume, for all its readability, is a necessity for the shelf of the serious student. It will almost certainly prove a classic: a splendid account of a great zoo.

—Frank Sartwell
Free-lance writer and book reviewer

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Elvira and Vladimir Clain-Stefanelli
(Riverwood, $25)

To open this book is to open the purse of Everyman, to peer inside its deepest reaches and witness a panorama—the lore, the lure, the good and the bad of money, "man's oldest, if not always most faithful companion," as the Clain-Stefanellis write.

It is evident that the authors have spent their lives studying, believing and advocating that human experience in all its "versatile, intriguing and fascinating ways" is reflected in coins, currency and medals and their histories.

The reader will find, as he reads of money from the earliest civilizations until the present, that he becomes richer in knowledge of history, archaeology, religion, economics, art, numismatics and many other fields. Illustrated with more than a hundred brilliant color plates and 200 black-and-white photographs, the text is written with the sharpness and brightness of a newly minted coin.

"Where man thinks, money lives," the authors declare. So they logically begin the first of the book's ten chapters with the discussion of primitive man's money, the earliest means of exchange. They move chronologically to chapters dealing with Greek coins, mirrors of an ancient world, and Roman coins, symbols of power, glory and belief.

The chapter on medieval coins reflects "a chaotic time when triumphant newcomers honored Roman law, Christian faith and the imperial artistic tradition." Coins from the Renaissance to modern times convey new hope and self-reliance, stimulating Man's creative powers.

As the United States approaches the celebration of its Bicentennial, coins of the New World, ranging from Columbus to Kennedy, take on a new dimension, a "deeper strike," to use the vernacular of the numismatist.

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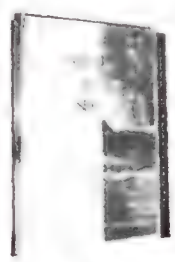

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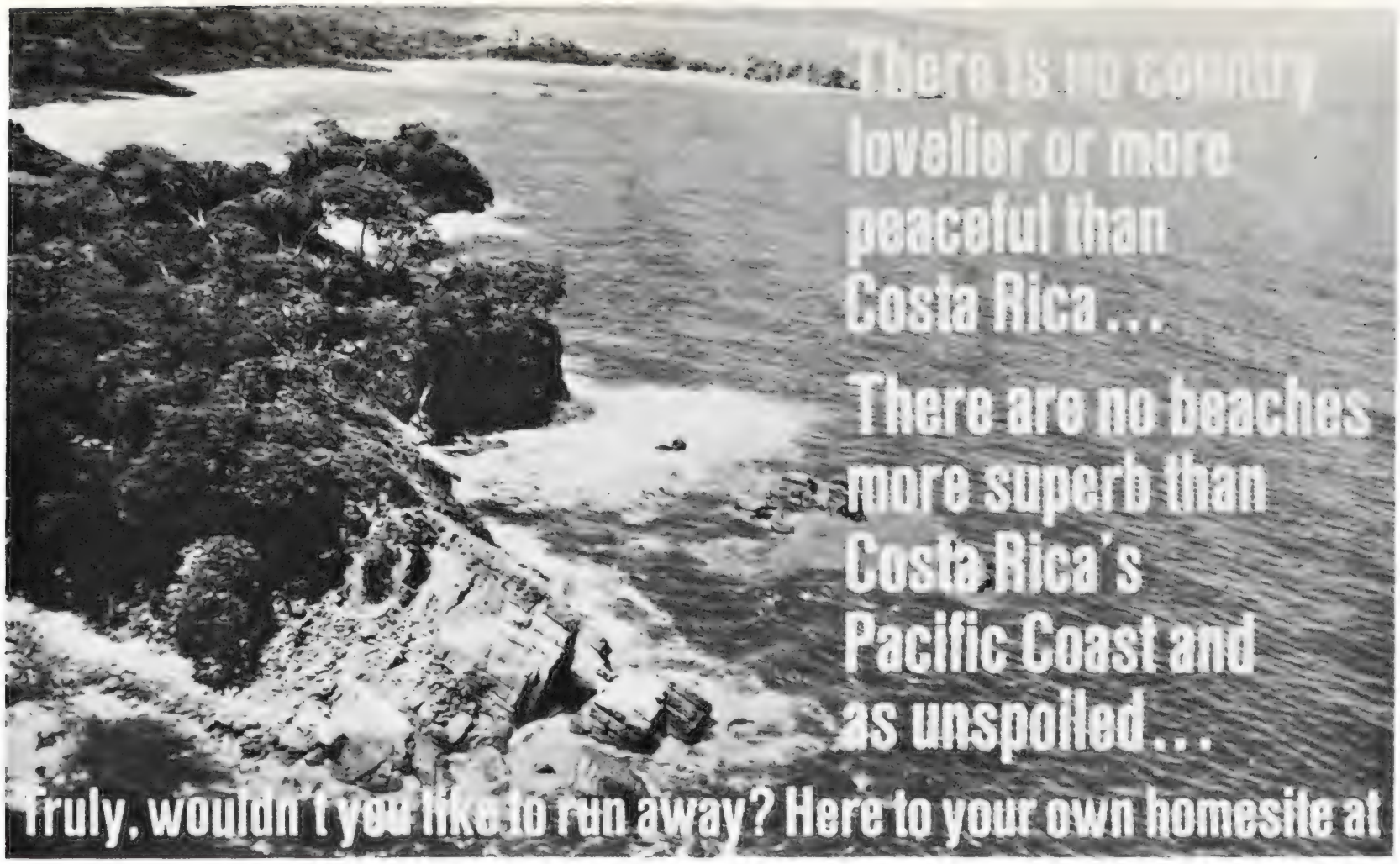

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Truly, wouldn't you like to run away here to this special garden of *ours? Doesn't your bruised spirit need the soft touch of loving peace*ful people, your tense body a breath of clean fresh air and a touch of pure ocean spray? Don't you long for a place where every day is gentle summer and soft Pacific wave-lapped beaches beg to heal you?

In the entire world, in our opinion, there is no country lovelier or more peaceful than Costa Rica. There are no beaches as superb and as unspoiled as Costa Rica's Pacific Coast. So we ask you again: wouldn't *you* like to run away here to your own homesite at the BEACHES OF NOSARA in this nature-blessed jewel of a country of Costa Rica.

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We're running out of space and there's so much more to tell you. We have prepared a portfolio for you including a large color brochure, question & answer booklet, plus a 96 page condensation of Prof. Donald Lundberg's authoritative book "COSTA RICA." Our *portfolio tells you how to reserve a homesite at the BEACHES OF* NOSARA and spells out our money-back guarantees: an unconditional 60 day deposit refund warranty; and a full year after signing contract to visit the property to see for yourself if it delights you. If not, every penny you've paid in is refunded without a word. If the BEACHES OF NOSARA in COSTA RICA sounds like your kind of place, we urge you to fill out and mail the coupon right away. No one will phone you or call on you. It's only the mailman you'll see.

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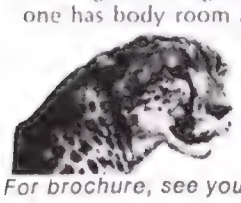

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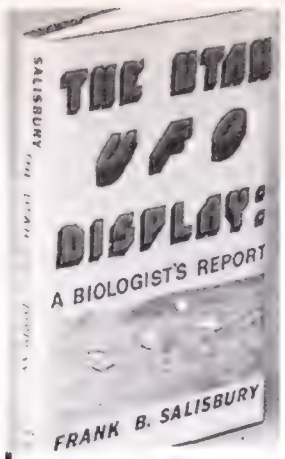

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to the Pacific. They devote individual chapters to paper money ("from chaos to confidence"); counterfeiting and collectors ("the art of coveting"); and Man's quest for immortality, as reflected in his penchant for medals.

Coin collectors have long been waiting for such a book. Because collectors so often are such great advocates of research and knowledge, they often say, "If you can't afford the coin, buy a book." Or, "First the book, and then the coin." Now, Everyman can reach into his own 20th-century purse and buy a great collection of numismatic material.

Lee Boltin's masterful photography, (SMITHSONIAN, December 1970 and other issues), evidenced in his earlier work with gems, minerals and other treasures, made him a natural for this book with its myriad facets to capture. The book's designer, Ray Ripper, is responsible for a further degree of excellence.

Only someone who handles many gold coins would detect that the gold coin illustrations occasionally display too much green in the color plates. But the sheen of the cowries, the patina of the ancients, the sparkle of jeweled badges, the chocolate toning of the copper are so real it is difficult not to try and pick them off the page.

A unique husband-and-wife numismatic curatorial team, the Clain-Stefanellis—who direct the Smithsonian Institution's Division of Numismatics—have, over the past two years, devoted their lifetime's experience to produce this book. Their scholarship shows on every page.

—Margo Russell
Editor, *Coin World*, a weekly newspaper

Travel Benefits for Smithsonian Associates

Ever since the beginning of the Smithsonian Associates, it has been the goal of the Smithsonian to establish a travel program meeting the needs of its membership. At first, a superb Foreign Study program under the direction of Dr. Richard Howland was available to Associates. In 1968, Domestic Study tours, strategically spotted across the country, were created. Now, a new travel benefit, Foreign Charter tours, has been added. This means there is a tour for every season, a tour for every taste and a tour for every purse. All trips are Smithsonian-sponsored, whether they are Foreign and Domestic Study tours (small group, specialized, intensive) or Foreign Charter tours (larger group, lower cost). Travel benefits are announced exclusively in SMITHSONIAN. For information on specific tours, write addresses below.

Domestic Study Tours

Winter Weekend in Old Sturbridge Village—January 17-19: The atmosphere of old New England; meetings with local curators and historians • **Baja Whale Watch**—February 7-15: Gray whales, sea lions and birds from San Diego to San Ignacio Lagoon, to San Benito and San Martin Islands on a 95-foot sport-fishing boat • **Yellowstone in the Snow**—February 15-21: Photographic survey by snowmobile coach of still life and unusual winter lights; a day at Grand Teton Environmental Education Center and accommodations at Old Faithful Snow Lodge • **Smithsonian Fine Arts Weekend**—March 7-9: An intensive visit with curators of Smithsonian art museums, including the Hirshhorn Museum and Sculpture Garden • **Georgia Burial Mounds**—March 19-25: Exploration of prehistoric cultures discovered at archaeological digs and burial mounds • **Death Valley**—April 5-13: Camping and study of the fascinating geology of this national monument; expeditions in four-wheel-drive dune buggies • **Pre-Civil War Mississippi**—April 13-20; Visit the Governor's mansion and the old capitol building in Jackson; meet with local historians and owners of antebellum houses in Vicksburg, Port Gibson and Natchez; enjoy the spectacular Southern formal gardens • Other planned tours include a trip to **Arizona** to study the Navajo and Hopi cultures and a weekend in **Philadelphia** in May; in June tours include a **Williamsburg** weekend especially designed for families with children aged 5 to 12, a tour of **French Quebec** and a trip following the heritage of the Lincoln family from **Kentucky to Illinois** • **Washington "Anytime" Weekend:** Choose any weekend to visit the nation's capital and enjoy a special tour of the Smithsonian Institution, two nights at the elegant Loew's L' Enfant Plaza Hotel, close by, and a chance to see other sites in Washington (all-inclusive price is $59.95) • Write Domestic Study Tours, SI 106, Smithsonian Institution, Washington, D.C. 20560.

Foreign Study Tours

The African Quest—February 14-March 25: Board the *MTS Apollo* at Dar es Salaam; circumnavigate Africa to Dakar; cruise up the Congo River • **Australia and New Zealand**—March 14-April 8: Flora, fauna and anthropology, via Tahiti and Fiji • **Northern Spain and Southern France**—May 13-June 4: Cave paintings and the art of Paleolithic man • **Classical Greece**—June 10-July 2: Archaeological sites in central Greece and the Peloponnesus • **Copenhagen to Lisbon**—August 23-September 14: Art and architecture cruise aboard the *Argonaut* to celebrate "European Architectural Heritage Year"; stops at major European ports • **Russia**—September 20-October 4: Art and architecture • **Hawaiian Islands**—November 8-21: Petroglyphs and natural history • Write Miss Bliss Schumann, Foreign Study Tours, SI 123, Smithsonian Institution, Washington, D.C. 20560.

Foreign Charter Tours

Great Britain—May 1-15 or September 25-October 9: The National Gallery, Tate, Victoria and Albert; walking tours of literary London and springtime excursions into the countryside; the best of London theater and performing arts • **Russia**—May 8-22, May 21-June 4, October 2-16 or October 16-30: The Bolshoi Ballet, Moscow Circus, Hermitage and schools, factories and hospitals in Moscow, Leningrad and Riga, accompanied by skilled guides and interpreters • Low cost of tours includes first-class hotels, most meals (full board in Russia), sightseeing, lectures, theater performances and round-trip air fare from New York • Open to members of Smithsonian Associates only • Write Robert Angle, 900 Jefferson Drive, Smithsonian Institution, Washington, D.C. 20560.

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Smithsonian highlights

National Collection of Fine Arts
"American Art in the Barbizon Mood" is a major exhibition featuring landscape and genre paintings by American artists of the late-19th century who were influenced by the French Barbizon School. Ninety-four paintings and 17 prints by 44 Americans comprise the major portion of the show. Also included are the works of nine French artists of the Barbizon group—opens January 23.

Thirty-three sculptures and paintings by the Russian-born artist Ilya Bolotowsky are on exhibition at NCFA. Bolotowsky's style, known as Neo-Plasticism, is one of pure geometric art, devoid of any emotion or reference to nature. The artist, a prolific abstract painter, was highly influenced by the works of Piet Mondrian.

Musical Weekend in Washington
The fourth annual musical weekend, featuring concerts in settings from the Opera House of the Kennedy Center to the Sculpture Garden of the new Hirshhorn Museum, will be held May 2-4. Included in the weekend are tours of Smithsonian museums and galleries, private dinners in Georgetown houses and the historic Smithsonian Castle, and a reception at one of the capital city's elegant embassies. A concert played on authentic, antique instruments from the Smithsonian's collection is a special event of this year's weekend. A limited number of reservations are available. Write to Musical Weekend, Museum of History and Technology, Room 4123, Smithsonian Institution, Washington, D.C. 20560.

Divisions of Performing Arts and Musical Instruments
The Jazz Heritage Series presents an "Evening of Jazz Piano" featuring three keyboard artists in spontaneous jam sessions and solo performances—January 5, 8 P.M., Baird Auditorium, Museum of Natural History.

The Hirshhorn Series features the "Philarte Quartet," from the Philadelphia Symphony Orchestra—January 19, 6 P.M., Hirshhorn Auditorium.

John Raitt, a leading man on Broadway for three decades, sings selections from *Carousel, Pajama Game,* and others in the American Popular Song Series—January 26, 8 P.M., Baird Auditorium.

Theater Chamber Players features works by Cowell, Rochberg, Crumb, Hindemith and Mozart—January 27, 8:30 P.M., Baird Auditorium.

For tickets and information about discounts for Resident Associates, senior citizens and students, call (202) 381-5395.

National Portrait Gallery
"Saint-Memin Engravings" is a collection of 761 engravings by 18th-century artist C.B.J.F. de Saint-Memin. The engravings of early American notables were given to the National Portrait Gallery by Mr. and Mrs. Paul Mellon.

The first exhibition in the new gallery of the Archives of American Art will remain on view through September 1975. The exhibition, on the first floor of the National Portrait Gallery, commemorates the 20th anniversary of the Archives of American Art and is the first in a series of shows to be selected from the vast collections of letters, documents, sketchbooks and photographs of 29 artists of the 18th, 19th and 20th centuries.

Museum of History and Technology
"Mr. Audubon and Mr. Bien" is an exhibit of John James Audubon's *Birds of America* illustrations, transferred from the French engravings by American lithographer Julius Bien. These chromolithographs popularized Audubon's work and established a landmark in the history of American color printing. The exhibition is in the third-floor Hall of Printing and Graphic Arts—through March.

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ERROR 2: Oops, I entered the wrong digit!

You're working a problem and you've entered 1.2356 when you wanted to enter 1.23 45. With most calculators you'd clear the entire last entry and start again. And you can do that with the Litronix. But the Litronix also has a backspace key which means you can backspace the number, digit by digit, and then enter the correct digits. In the example above, press the backspace key twice, eliminating the 5 and 6 so you end up with 1.23 on the display. Then add the 4 and 5 to make 1.2345.

ERROR 3: Oops, I read the decimal wrong!

Litronix has developed an eight-digit display whose decimal is in the center of a digit position, automatically separating the whole numbers from the decimals by the widest margin of any display. So there's no guesswork when it comes to spotting your decimal.

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Easy-to-use The Litronix features algebraic logic which means that you perform the functions exactly as you think.

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Fast percentage system You perform percentage problems exactly as you think. For example, to subtract 5% from $50, enter $50, press the minus key and then the five and percent key. An answer of $47.50 is on your display. In short, only four sets of entries were required to get your final answer.

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Puppet Theater,
Arts and Industries Building
"The Book of Three" is an adventurous tale based on a book by Lloyd Alexander. It is a story of evil and good, a fantasy rooted in reality and truth. Children under three excluded. The theater will be closed January 13-30 in preparation for a new show, "Treasure Island." For ticket information and performance times, call (202) 381-5395.

Hirshhorn Museum
and Sculpture Garden
The Smithsonian's newest museum (see p. 42) is now open to the public. The Hirshhorn collection includes 6,000 modern paintings and sculptures, some 800 of which are displayed in historical sequence in this exhibition. Internationally renowned works by Rodin, Henry Moore, Picasso, Calder, Matisse and Giacometti are among the acquisitions. Entrance is located on Independence Avenue, N.W.

Air and Space Museum,
Arts and Industries Building
"Life in the Universe?" is a major new exhibit exploring the possibilities of extraterrestrial life. The exhibit, a mixture of fact and speculation, features artist's conceptions of weird flying creatures and swimming carnivores (see October SMITHSONIAN), and discusses the origins of life on Earth, as well as on other planets.

Smithsonian Commons
Located in the original Smithsonian Castle building, the Commons offers a new luncheon menu with individual service for a fixed price of $3.25. Hours are 11:30 A.M. to 2 P.M., Monday through Friday. An Associates card is required.

Fall Museum Hours
The Smithsonian museum buildings are open daily from 10 A.M. to 5:30 P.M. Hours for the National Zoological Park are 9 A.M. to 4:30 P.M. daily.

Parking on the Mall
Metro construction has made parking on the Mall near the Smithsonian complex extremely difficult. All parking prior to 10 A.M. is restricted. The use of public transportation is recommended. Write Associates' Reception Center, Smithsonian Institution, Washington, D.C. 20560, regarding fringe parking locations and public transportation.

Traveling Exhibition Service
There are up to 70 different Smithsonian-sponsored exhibitions on display each month throughout the United States and Canada. For a complete listing and information on how to bring an exhibit to your area, write: Traveling Exhibition Service, Smithsonian Institution, Washington, D.C. 20560.

- Mobile, Alabama—"200 Years of Royal Copenhagen Porcelain" (Mobile Art Gallery, January 18-February 23).
- Little Rock, Arkansas—"Folk Paintings from Dalarna" (Arkansas Art Center, January 11-February 9).
- Newark, Delaware—"Our Only World" (University of Delaware, January 18-February 16).
- Washington, D.C.—"Egyptian Tapestries from the Workshop of Wissa Wassef in Harrania" (Textile Museum, January 4-February 23).
- Logan, Kansas—"Guajiro Tapestries from the Mali Mai Workshop, Venezuela" (Dane G. Hansen Memorial Museum Association, through January 12).
- Alfred, New York—"The Avant-Garde in Theater and Art" (State University of New York, College of Ceramics, January 26-February 23).
- Wytheville, Virginia — "The Black Presence in the Era of the American Revolution" (Wytheville Community College, January 25-February 23).

Contributing Memberships
Persons who contribute $50 or more annually to the Associates support the Institution's national educational programs and enjoy additional privileges. Graduated benefits include:
- Assistance in communicating with any part of the Smithsonian.
- Information on any museum in the world in advance of a visit there.
- Smithsonian annual report and other publications.
- Invitations (when in Washington) to exhibition previews and special events, including admission of a guest.
- Research service for questions about subjects related to the Smithsonian.
- A remembrance from the Smithsonian in the form of a commemorative object or work of art. Write: Contributing Membership, Smithsonian Associates, Smithsonian Institution, SI 118, Washington, D.C. 20560.

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By Patrick Ryan

Power of prayer provides hot tips from On High

Gambling men still searching for the infallible system may find cheer in the report from Lincolnshire, England, that a Roman Catholic priest has disclosed that he was once enabled to pick winners by the power of prayer. Before taking holy orders, he was a chronic gambler and claims that he was twice given divine tips after praying desperately for absolute inside information.

"I got spiritual help from the Church," he explained, "and when I bought a paper the name of one particular horse seemed to glare up at me."

And by backing the nag, he was once provided with about $190.

Consequently, believing that he was being called to the Church through his only interest, he took up the priesthood and hasn't placed a bet or received a heavenly hot tip since. He still follows racing enthusiastically in the newspapers, but whenever he tries to pick a winner in his mind, the selected steed never wins. Which leads those of secular and commercial mind to wonder why he didn't remain with the laity while he was on to a good thing.

I am prevented from gambling myself because of a melancholic gene which precludes any pretension to winning and a frugal chromosome which abhors any prospect of losing. Nevertheless, though thus handicapped, I can assure the sporting reverend that there are many examples in the Bible of gambling. Biblical leaders called on chance to ascertain the opinion of the Almighty on matters of much greater import than which nag will be first past the post. Lots were frequently cast to settle disputes, distribute property or divine God's will.

For example, the Lord instructed Moses near Jericho to divide the land of Canaan among the people of Israel by lot, thus generously taking upon Himself any obloquy arising from the unluckier families who were landed with a minimum of topsoil and a surfeit of stones. Brother Aaron was ordered to choose the scapegoat by similar means on an even-money chance. And when Jonah tried to evade the Lord's behest to go preach against Nineveh, divine retribution nominated him—by the casting of lots—for a sudden sea bath and three days' repentance in the belly of leviathan.

So earnest was the belief of the ancient Hebrews in the propriety of consulting Jehovah on a sporting basis that their laws discouraged gambling for profit or pleasure, and ordained that its practice should be confined to serious divination.

Our 20th-century popular passion for gambling may have atavistic connection with this primitive practice. As L. J. Ludovici notes in his book, *The Itch to Play,* "modern psychology tends to confirm the view that gambling is a sportive survival of divination. . . . The gambler likes to think of a divinity at his shoulder ready at any moment to intervene. . . ."

The current number of adherents to the God of Luck is not available, but more Americans gamble than go to church. Thus Las Vegas arises as a latter-day New Jerusalem, and its fevered visitors are but modern pilgrims to their holy city. They certainly pass their days there ceaselessly appealing, before slot machine, roulette table and crap game.

Local medical reports attest that they suffer for their faith just like the anchorites and flagellants of old, and perform physical penance in the course of their sacred rituals. Las Vegas doctors have found that crapshooters who spend marathon sessions at the table suffer from varicose veins and other circulatory disorders.

The presence of such zealots among the congregation will doubtless insure continued multiplication among followers of the God of Luck. And so it may come to pass that, no matter what castigation he may currently have to bear from his bishop about his gambling past, the lucky priest of Lincolnshire may later find that his horse-racing experience will be just the crucial qualification earning him an appointment to episcopal office in a major Las Vegas "cathedral."

He may also, perhaps, take comfort from other straws in the wind. Despite repeated denunciation, some Italians still run a pari-mutuel pool known as the *totopapa* on the field of cardinals coming up to the starting post for each papal election. And earlier this year, leading London bookmakers made book on the Archbishop of Canterbury stakes. Just to keep his hand in, our Lincolnshire priest might try making book as to which of his parishioners will precede a camel through the eye of a needle.

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